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THE TREATMENT OF ACUTE PERFORATION IN PEPTIC ULCERS.[1]

By ALFRED J. TRINCA,
Melbourne.

ACUTE PERFORATION of a peptic ulcer is a grave surgical emergency, which if left untreated will cause the death of the overwhelming majority of its victims. If they are treated surgically the majority will recover; but there will still occur, apart from inevitable deaths due to circumstances beyond the surgeon's control, deaths which in many cases are avoidable, and which the statistics produced strongly suggest are the result of incorrect and irrational surgical procedures. It is the object of this paper by argument and by conclusions derived from the study of mortality statistics to indicate how this controllable mortality can be considerably lowered.

The statistics presented are compiled from 568 consecutive cases, dating from February, 1920, to June, 1946. The series is larger than any that can be found in the literature dealing with similar cases from a single hospital or large clinic. The number of cases is large enough to eliminate the element of coincidence. During the same period there were eight cases which are not included in the statistics, because at operation it was found that Nature had closed the perforation with plastic lymph. The surgical procedure performed in these cases was more in the nature of an exploratory operation, and as it did not represent any form of treatment relevant to the problem of this paper, they are not included in the statistics. It must also be noted that many of the cases date back to a period when we were not conversant with modern methods of treatment of shock, ileus and the other serious effects and complications of peritonitis. The Rehfuss tube was not in vogue, and there were no sulphonamide drugs and no penicillin for the treatment of the commonest fatal complication—namely, pneumonia. Therefore a low mortality rate among these early cases gives added weight and significance to the particular surgical treatment adopted.

The patients were operated on by surgeons of all degrees of experience and technical skill. These included not only the senior members of the honorary surgical staff and the emergency surgeons, but junior officers, such as medical superintendents and registrars. The two last-mentioned particularly functioned during the war years when the honorary hospital staff was depleted by war service. The post-operative mortality rates of different surgeons did not necessarily vary directly with the experience and seniority of the surgeon. The surgeons with the lowest mortality rates were those who adopted the simplest and most rational form of treatment.

It is well recognized that certain factors, such as the age of the patient, the duration of the perforation, the general condition of the patient and any intercurrent disease, influence the mortality rate; in many cases they have a grave prognostic significance resulting in a mortality rate that no efforts on the part of the surgeon will rectify. This particularly applies to the duration factor. To these I would add a fifth of at least equal importance—namely, the particular form of surgical treatment adopted. It is this last-mentioned factor which will be discussed at length, and which constitutes the main theme in this paper. The statistics that will be shown indicate that even when the first four factors are operative, many patients who are almost moribund may be saved by the correct treatment. A disturbing loss of life will be shown to have occurred among young people and people of all ages with a very short period of perforation. This mortality is largely avoidable, and it is my contention that the high mortality rate is due to incorrect surgical procedures.

[1] Read at a meeting of the Alfred Hospital Clinical Society on September 24, 1946.

The Pathology of Diffuse Peritonitis.

The peritoneal cavity is only a potential cavity. It is completely filled with solid and hollow viscera, the latter having attached to them their mesenteries and omenta. The hollow viscera contain gas at atmospheric pressure. All the organs are in the closest possible contact with one another and with the parietes, and any space that exists between them or between coils of intestine is occupied by a small quantity of natural peritoneal exudate. There is no dead space. When perforation of a peptic ulcer occurs a quantity of irritating gastric or duodenal contents, usually large in amount, is poured out, and contaminates all the parietal and visceral peritoneum with which it comes in contact. The result is an immediate inflammatory reaction, which can be divided into three stages which overlap to some extent, particularly when the irritative stimulus is prolonged or continuous.

The Hyperæmic Stage.

The endothelial lining of the peritoneum is very thin and permeable, and the changes that occur in the sub-peritoneal tissues become easily visible and involve with ease and rapidity the peritoneal cavity. In this sub-peritoneal zone are fat, loose areolar tissue, innumerable blood vessels, lymphatics and somatic nerves, and in addition potential capillaries, which function only in the

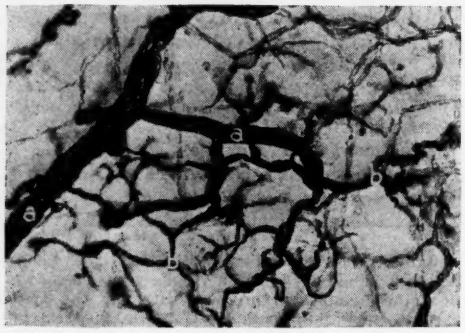

FIGURE I.

Potential vessels of the peritoneum: (*a*), (*a*), vessels visible to the naked eye in the normal state; (*b*), (*b*), vascular channels made visible by the injection of silver nitrate. (After Hertzler.[1])

presence of inflammation. They have been well described by Hertzler,[1] who demonstrated their presence by the injection of silver nitrate. They are so small that in ordinary circulatory conditions they cannot accommodate blood cells. With the beginning of the reaction to inflammation these channels dilate and cells travel through them, and as they have exceedingly delicate walls, fluid can pass through with the greatest ease. (See Figures I and II.)

The response to inflammation in this sub-peritoneal zone is almost as rapid as in the case of the conjunctiva, as can be noted by the rapid change of colour from buff to pink that occurs in coils of small intestine when they are handled or exposed to the air.

The Exudative Stage.

Owing to the permeability of the thin peritoneal lining of the abdomen and of the intestine, irritating products from the peritoneal cavity, such as gastric or duodenal contents or bacterial toxins, can easily affect the sub-peritoneal zone of both the parieties and the intestine. The reactionary exudate which forms in the former zone can as easily escape into the peritoneal cavity. Toxic spoiling of the endothelium increases the permeability. Irritation of the abundant nerve endings and nerve plexuses produces intense pain and a muscular rigidity that is immediate and complete. It is aptly described as board-like.

The Plastic Stage.

From the exudate which is poured out in large quantities—pints or even quarts—fibrin is deposited on inflamed surfaces; but this fibrin varies in degree and type according to the nature of the irritating agent. For example, chemical irritant will delay its formation, as also will the products of certain bacteria, such as the streptococci. The effect of the formation and deposition of fibrin is to limit absorption and to localize inflammatory exudate, if it is small in amount, in the neighbourhood of the primary focus, or if it is large in amount, to loculate it in various compartments separated from one another by pneumatic barriers. The exudate is alkaline in reaction and is rich in leucocytes and antibodies. The greater the number of leucocytes and the amount of fibrin, the more purulent it appears. There is an erroneous conception that because an exudate looks purulent it is therefore more virulent and dangerous than the thin exudate. The truth is that the reverse is often the case, and that the degree of purulence is generally an index of the patient's powers of resistance rather than of the virulence of the infection. The thinnest exudate and that containing the smallest number of leucocytes and the poorest in fibrin content is that produced by certain fatal strains of streptococci.

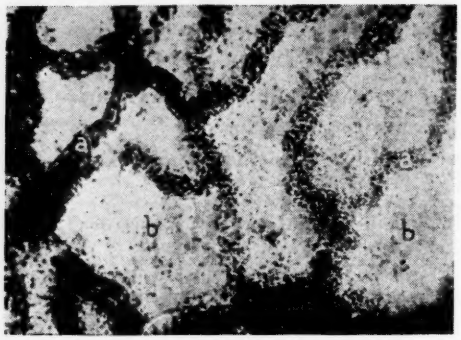

FIGURE II.

Dilated potential vessels in the mesentery in acute inflammation: (*a*), (*a*), potential vessels; (*b*), (*b*), areas between the network of blood vessels, which are œdematous and contain many leucocytes. (After Hertzler, *loco citato*, page 70.)

The Infectivity of the Exudate.

A good deal of investigation has been carried out on the natural and pathological exudates in the peritoneal cavity. In 1933, Roberts, Johnson and Bruckner[2] investigated the bacterial content of peritoneal fluid and gave their findings in an article entitled: "The Aseptic Peritoneal Cavity—A Misnomer." Cultures were prepared from human peritoneal cavities which presented none of the clinical manifestations of peritonitis, and were compared with cultures prepared from peritoneal cavities which showed recognizable manifestations of inflammatory reaction. Cultures were prepared from peritoneal cavities of patients who were operated on for hernia, uterine fibroid tumours and *retroversio uteri* and who underwent interval appendicectomies, and the results were surprising. All possible precautions were taken to prove that the growths were not from the skin or air-borne. These workers concluded that the presence of bacteria within the peritoneal cavity was not dependent upon the presence or absence of an active intraperitoneal inflammatory lesion. Almost as many cultures could be obtained from the uninfected as from the contaminated peritoneum. In 80% of instances a growth could be obtained from material taken from within the peritoneal cavity irrespective of the presence of intraperitoneal inflammatory reaction. "There is no such thing as intra-peritoneal asepsis."

These findings afford strong evidence of the natural resistance of the peritoneal cavity. If more is needed, we have only to note the comparative effects of a gangrenous

appendix on the peritoneal cavity (fatal bacterial peritonitis being a rare event when early operation is performed) and the wound sepsis so common in such cases, when all precautions have been taken to avoid contact with inflammatory material. Again, it is rare for an infection of the peritoneal cavity to occur from penetrating stab wounds that do not involve a hollow viscus.

Other observers have made bacteriological studies of the peritoneal fluid in cases of perforated peptic ulcer, and all agree that in the early stages the exudate in the majority of cases is sterile, but that after six to twelve hours the percentage of cultures obtained is much greater. The commonest organisms found are staphylococci, streptococci and colon bacilli. Davison, Aries and Pilot[3] in 1939 obtained only 18% of cultures when the duration of perforation was under six hours, and 75% when the duration was from twelve to eighteen hours. Graham and Tovee[4] in 1945 attempted to prepare cultures in 59 cases, and found that in 34 the exudate was sterile; they concluded that bacterial peritonitis was a late manifestation in perforation.

TABLE IA.

Patients.	Number.	Deaths.	Percentage.
Male	536	81	15·1
Female	32	7	21·8
Patients treated by drainage	165	49	29·69
Patients not treated by drainage	403	39	9·67
Total	568	88	15·47

TABLE IB.
Age.[1]

Age.	Years.
Average	46
Lowest	18
Highest	84
Average age of patients treated by drainage	56
Average age of patients not treated by drainage	56

[1] There were 22 patients aged seventy years and over; 11 died.

It would appear from a comparison of these investigations with those of Roberts, Johnson and Bruckner[2] that the bacterial content of the peritoneal fluid in cases of perforated peptic ulcer in the early stages is less than that in the normal cavity. It is well known that hydrochloric acid has an inhibitory effect on the growth of bacteria, and this probably explains this apparent paradox. Bacteria are seldom found in the normal stomach, and when hyperacidity is present, as in cases of ulcer, the number will be still less. It is only later when the defensive mechanism of the body has been exhausted by prolonged attack, such as occurs in the presence of a continuously leaking perforation, that serious bacterial peritonitis develops.

To sum up: the exudate in the early stages of perforated peritonitis is purposive and protective, in that it is antacid and antibacterial and delays absorption and in some cases localizes the effects of infection.

Any exudate that is removed at operation will be immediately followed by at least as great an amount, because spoiling of the endothelium is still present, and the misdirected efforts of the surgeon in the form of swabbing and the use of the suction tube will add the factor of mechanical irritation. The effect will be the pouring out of an increased quantity of fluid probably not so rich in leucocytes and antibodies, and the net result will be serious dehydration which the patient can ill withstand. The effects of dehydration due to removal of exudate can be studied by comparing, some hours after operation, the tongues of patients suffering from peritonitis who have or have not had the exudate removed.

Owing to the anatomical nature of the peritoneal cavity, with its lesser sac and various compartments and pneumatic and mesenteric barriers, it is impossible to remove more than a fraction of the inflammatory exudate. If this is infected and true bacterial peritonitis is present, removal of some of it will not save the patient. The organisms existing in the fluid that is left will continue to multiply in a fluid enriched by a new supply of pabulum. They will kill the patient unless his natural

TABLE II.
Patients Aged Seventy Years and Over.

Type of Ulcer; Presence or Absence of Drainage.	Number of Cases.	Deaths.
Duodenal	11	6
Gastric	11	5
Total	22	11
Drainage (average duration of perforation, 9·3 hours)	9	7
No drainage (average duration of perforation, 8·0 hours)	13	4

resistance can overcome them or unless they can be successfully dealt with by modern chemotherapeutic measures. By the time bacterial peritonitis has been established, bacteria and their toxins have penetrated into the sub-peritoneal zone and are inaccessible to any surgical form of treatment.

The Question of Drainage.

It should be obvious to anyone who appreciates the anatomy and physics of the peritoneal cavity that it is impossible to drain this cavity. A purulent diffuse exudate in the peritoneal cavity is in a very different state from pus under tension in a localized abscess. Incision and drainage of the latter will allow of the escape of pus and in most instances bring about the control or subsidence of the infective process by permitting

TABLE III.
Duration of Perforation; Cases in which Drainage was Used.

Hours.	Number of Cases.	Number of Deaths.
1 to 6 ..	82	17
7 to 12 ..	46	13
13 to 24 ..	28	14
Over 24 ..	9	5
Total ..	165	49

the defensive leucocytic barrier to do its work. In diffuse peritoneal collections conditions are very different; there is no rigid wall, and the exudate in the main is not accessible to drainage. Either it is loculated in pockets isolated by plastic lymph, or it exists in the natural sub-compartments of the peritoneal cavity which are more or less separated by pneumatic barriers. Even when no adhesions are present and when peritoneal exudate has displaced coils of intestine as in the case of ascites, the most persistent efforts of parcentesis will not remove all the fluid; a considerable quantity will still remain in the flanks and in other regions of the abdomen. In peritonitis the insertion of a drainage tube or tubes after closure cannot possibly be effective. On closure of the abdomen there occurs immediate contact of intestine or omentum with the opening or openings in the tube, or these openings are quickly sealed with plastic lymph. Any

fluid that escapes from a drainage tube is either that which filled the tube when it was inserted, or the exudate produced by the tube now acting as an added embarrassment in the shape of a foreign body. This is the fluid that is seen to escape when the tube is removed thirty-six hours or more after operation. It is not part of the exudate produced by the peritonitis.

I can imagine no more futile or unsurgical procedure than the introduction of a tube into the pelvis in cases of diffuse peritonitis. Water will not run uphill, and the suprapubic tube, even if it remained open, could not possibly contact any but an insignificant quantity of the exudate, as the pelvic cavity is not like a hollow vessel, but is completely filled with viscera which are mainly hollow and mobile. Animal experiments and a consideration of the statistics about to be produced will show that the drainage tube can only be productive of great harm.

In 1931 Buchbinder and Droegemueller[5] set out to establish the danger of drainage in peritonitis. They produced in dogs perforative peritonitis pathologically identical with human peritonitis. Contamination of the peritoneal cavity was produced by making an opening in the lower part of the ileum, which was closed after twenty-four hours. If the loop was not closed, over 90% of the animals died. If after twenty-four hours the hole in the ileum was repaired and the abdomen was closed, the mortality rate was reduced to 58%. If in addition to closure, drainage with a soft rubber tube was used, the mortality rate was 100%. In their article these authors state that "every medical student is taught that drainage of the peritoneal cavity is physically impossible".

Should not the drainage tube be regarded as a lethal weapon? I am firmly of the opinion that there is not the slightest justification for its use in the treatment of diffuse peritonitis, and I would claim that the burden of responsibility should not be placed upon the shoulders of the man who does not employ drainage. The slogan "when in doubt drain" should be altered to "when in doubt do not drain".

TABLE IV.
Duration of Perforation; Cases in which No Drainage was Used.

Hours.	Number of Cases.	Number of Deaths.
1 to 6 ..	282	18
7 to 12 ..	84	13
13 to 24 ..	28	11
Over 24 ..	9	2
Total ..	403	39

TABLE V.
Final Cause of Death.

Cause of Death.	Number of Cases.
Toxæmia	22
Subphrenic abscess	15
Post-operative shock	14
Pulmonary complications ..	14
Intercurrent disease	8
Ileus	7
Fistulæ	4
Intestinal obstruction	2
Hæmatemesis	1
Wound infection (*Bacillus welchii*)	1

The Evil Effects of the Drainage Tube.

There are other evil effects of the drainage tube, both immediate and remote, apart from the fact that it increases the degree and fatal effects of peritonitis. The immediate effects are: (i) the production of duodenal, gastric or ileal fistulæ (nearly always fatal; there were four such cases in this series), (ii) the production of ileus, (iii) acute intestinal obstruction, (iv) increased incidence of complications, particularly subphrenic abscess and pneumonia, (v) delayed convalescence. The remote effects are: (i) incisional hernia and (ii) intestinal obstruction from adhesions.

Finally, let me quote Shipley,[6] who in an editorial in *Surgery, Gynecology and Obstetrics* written in 1935 made the following statement:

> The placing of drainage material where it comes in contact with loops of small intestine is to invite obstruction either as an early or late mishap, or to condemn the patient to an uncertain period of partial disability caused by angulation due to adhesions.

TABLE VI.
Complications; 116 Cases in which Drainage was Used; Recovery.

Complication.	Number of Cases.	Percentage.
Wound infection	22	18·9
Pulmonary complications	14	12·0
Thrombosis	5	4·3
Subphrenic abscess	2	1·7
Total	43	37·0

Treatment.

Diffuse spreading peritonitis from perforated peptic ulcers is a surgical emergency, second in gravity only to intraperitoneal hæmorrhage or intestinal rupture. The patient is usually in a condition of extreme, unbearable and continuous pain, and is suffering from peritoneal shock. It must also be remembered that the majority of the subjects of perforated ulcer are suffering from some degree of malnutrition and anæmia. The duty of the surgeon therefore should be to adopt the most rapid, simple and effective life-saving measures, and not to engage in any unnecessary or harmful procedures.

The statistics will show that a number of avoidable deaths from post-operative shock occurred within twenty-four hours of operation and that some of these occurred in cases in which the duration of the perforation was under six hours, the patients being comparatively young. It is my contention that many of these patients could have been saved by the adoption of the proper pre-operative treatment.

TABLE VII.
Complications; 364 Cases without Drainage; Recovery.

Complication.	Number of Cases.	Percentage.
Wound infection	20	5·5
Pulmonary complications	19	5·2
Subphrenic abscess	12	3·3
Rupture of abdomen	4	1·1
Pelvic abscess	2	0·55
Total	57	12·8

A common procedure when a patient with a perforated ulcer is admitted to hospital is for the admitting officer to inform the operating surgeon by telephone that such a patient has been admitted. Instructions are then given by the surgeon to send the patient at once to the operating theatre, and the patient, who has been given a dose of morphine, is operated on as soon as possible. In some cases there is a doubt about the diagnosis, and morphine is withheld until the surgeon arrives. A diagnosis of perforation now having been made by the surgeon, morphine is administered, and the patient is sent to the operating theatre before the morphine has had time to have its full effect. No attempt is made to treat the

condition of shock, which in many cases is extreme. It is my firm contention that the mortality rate in this group could be lowered by the prompt relief of pain by adequate doses of morphine and by the treatment of shock by the intravenous administration of glucose-saline solution. Only when the patient has recovered a little should he be removed to the operating theatre. He should not be taken there whilst in agonizing pain. A delay caused by such pre-operative treatment is beneficial rather than the reverse, and will save lives. Graham and Tovee,[1] whose mortality rate in 114 consecutive cases of perforated peptic ulcer is the lowest on record, stress the importance of pre-operative treatment in lowering the operative mortality rate. As bacterial peritonitis is a comparatively late manifestation, they advocate deferring the operation even for as long as twelve hours if pre-operative treatment will improve the patient's condition and enable him to withstand an operation.

FIGURE III: Stage I.

Anæsthesia.

My practice is to use gas anæsthesia as being productive of the least amount of anæsthetic shock, and less likely than ether to produce pulmonary complications. Recently spinal anæsthesia has been advocated, and is said to have reduced the post-operative mortality rate. Possibly this is because spinal anæsthesia produces immediate and complete relief of pain and sufficient relaxation to allow of quick operating and closure of the perforation by the old and orthodox methods.

Closure of the Perforation.

The insertion of a purse-string suture and the enfolding by sutures of an ulcer in a line at right angles to the long axis of the stomach or duodenum is often very difficult, particularly when the ulcer is large, owing to the tearing out of sutures from the brawny indurated area surrounding the perforation. When the operation of closure by such methods is completed, the surgeon often has the fear, at times justified, that the procedure may have produced partial or complete occlusion of the pyloric canal or duodenum, so he proceeds to perform a gastro-enterostomy or partial gastrectomy, thus adding half to one hour to the operating time.

For some years I have used a simple and effective method of closure which can be performed in two or three minutes. A tag of neighbouring omentum is isolated, and a suture of number "0" or "00" chromicized gut is passed through the tip of this tag and securely tied. Then each end of the suture is threaded with a round curved needle and the needle is passed through the perforation into the lumen of the stomach or duodenum and then pushed through at two separate points beyond the ulcer area and securely tied over the peritoneal surface of the stomach or duodenum. This introduces a plug of omentum, which not only hermetically seals the perforation but covers the central portion of the ulcer. To make doubly sure, a suture is placed on either side of the omental tag to affix it to the serosa on the near side of the perforation. The omentum is resistent to acid and pepsin, and will remain *in situ*. Firm adhesions will form between it and the edges of the perforation. (See Figures III and IV.)

Treatment of the Exudate.

It is necessary in most cases to remove enough of the exudate to render the perforation visible. Also, if particles of food are visible—which by the way is not common, as the perforation is generally too small to allow of their escape—the exudate containing these should be removed,

FIGURE IV: Stage II.

not on account of the possibly infective nature of such particles, but because they might act as foreign bodies and produce future adhesions. I strongly condemn any further attempts at removal of the exudate for reasons already stated in my discussion of the pathology of perforative peritonitis. I am also convinced that the leaving of exudate is not the essential cause of subphrenic or pelvic abscess.

The Drainage Tube.

Animal experiments, the lowered mortality rate noted by other observers, and the pronounced contrast between the results obtained at this hospital with drainage and without drainage, indicate that the drainage tube is a dangerous lethal weapon and can only be productive of harm. There are only two indications for the use of drainage material in diffuse peritonitis following perforated peptic ulcer. The first of these is inability to locate the perforation. The perforation usually occurs high up in the stomach, and in such cases a piece of soft rubber dam introduced to the supposed site of perforation and let out through the abdominal wound may direct the escaping contents away from the general peritoneal cavity. The second indication is the need for drainage of a localized collection of pus, such as obtains in a subphrenic abscess.

Treatment in Late Cases.

Whilst there are many surgeons who agree with the view that drainage is unnecessary in early cases, there was only one reference in the literature that I could find in which the drain was abolished in all cases, and these mortality rates are the lowest of all published.[6]

In late diffuse peritonitis, when bacterial toxins have been added to the chemical irritant, the degree of spoiling of the peritoneum is much increased, and in the case of the small intestine it extends to the involuntary muscle, which undergoes granular degeneration, loses its tone and produces ileus. The post-operative mortality

FIGURE V: Stage III.

rates in these cases can be reduced only by the most rapid and minimal surgical procedures. I have already pointed out the futility of attempting to control the infection by removing some of the infected fluid and of attempted drainage, and owing to the serious condition of the patient there is less justification than ever for the adoption of either of these procedures.

Summary of Treatment.

1. The adoption of adequate pre-operative treatment, such as the relief of pain and treatment of shock.

2. Correct anæsthesia.

3. Removal of only enough exudate to allow visualization of the perforation, and in cases in which gross contamination by visible food particles is present, removal of the food particles.

4. Closure of the perforation by the most rapid and the simplest technique.

5. Preparation of a culture from the exudate.

TABLE VIII.
Subphrenic Abscess.

	Number of Cases.	Number of Deaths.
Drainage used	12	10
No drainage used ..	17	5

6. Closure of the abdominal wound without any form of drainage.

7. If peritonitis is well established, the use of modern chemotherapeutic measures to combat infection (such as penicillin and the sulphonamides), and the adoption of modern methods to maintain fluid balance, to promote retention of chlorides and to relieve intestinal distension.

Finally, a follow-up investigation of patients who have been treated for perforated peptic ulcer shows that only a minority are cured or free from symptoms as the result of the perforation and its closure. This shows the necessity for keeping such patients under medical treatment, and if necessary under further surgical treatment.

Statistics

The following statistics afford overwhelming support for the thesis that incorrect surgical treatment is not only one of the greatest causes of death in perforative peritonitis, but also increases the incidence of complications, the mortality rate from such complications, and the length of stay in hospital.

Of the cases in which drainage was used, in 19·4% over twenty-eight days in hospital were required; of the cases in which no drainage was used, in 13·4% over twenty-eight days in hospital were required.

Commentary on Statistics.

From whatever standpoint these figures are considered, it is abundantly evident that treatment by drainage can do nothing but harm.

In the cases in which drainage was used, attempts were made by the use of the suction tube, packs and swabs to remove the exudate, and tubes or occasionally a rubber dam were inserted in various sites, sometimes single, sometimes multiple. The contrast in mortality rates between the cases with and without drainage is striking and should influence any surgeon whose aim is to save as many lives as possible in diffuse peritonitis from perforated peptic ulcer. The mortality rate in the total number of cases in which drainage was used was more than three times as great as in the cases without drainage. Among the aged it was two and a half times as great.

A study of Tables II, III and IV shows that the factors of age and duration of perforation did not invalidate the statistics, but on the contrary strengthened the case against drainage. For example, with regard to age, the mortality rate among the patients aged seventy years and over was two and a half times greater when drainage was used than when it was avoided. Tables III and IV are still more significant, in that when the duration of perforation was one to six hours, the mortality rate when drainage was used was almost five times as great than when drainage was avoided, and the rate was consistently greater in all the other groups. Again, the incidence of complications was nearly three times as great when drainage was used as when it was not used, and one of the most fatal complications, subphrenic abscess, was more than two and a half times as frequent. Finally the average stay in hospital was half as long again when drainage was used as when it was not used.

Summary.

1. The pathology of diffuse peritonitis from acute perforation of peptic ulcers is discussed.

2. The mortality rate can be reduced by the adoption of simple and more rational forms of treatment.

3. A simple method for the rapid closure of a perforated ulcer is described.

4. The use of drainage material and the removal of protective exudate are condemned, and the condemnation is supported by irrefutable statistics.

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(5) J. R. Buchbinder, W. A. Droegemueller and F. R. Heilman: "Experimental Peritonitis; Effect of Drainage upon Experimental Diffuse Peritonitis", *Surgery, Gynecology and Obstetrics*, Volume LIII, December, 1931, page 726.

(6) A. M. Shipley: "Drainage of the Peritoneal Cavity and Intestinal Obstruction", *Surgery, Gynecology and Obstetrics*, Volume LX, 1935, page 1016.

MUST SYPHILIS STILL SERVE?

By REG S. ELLERY,
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IF Solomon had seven hundred wives—and we are enjoined by Saint Paul to marry rather than to burn—then Henry VIII's matrimonial affairs were meagre for a monarch of his prowess, and the number of his concubines was insignificant. Nevertheless, history is silent regarding Solomon's harem, but loud in its denunciation of Henry who has been deemed a monster, not by his subjects who loved him, but by the outraged sensibilities of queasier generations.

Students of Tudor history may sometimes feel that "those were the days", when England, lately awakened from the sleep of the Middle Ages, was a green and leafy and under-populated island, sea-girt and fertile, a realm to which Henry VII, the descendant of a Welsh butler, had, after the devastating Wars of the Roses, brought a glad span of peace and a semblance of prosperity. Those, indeed, were the days of simplicity, when the king's word was law and the gallows claimed the dissentient; when, in the poor man's house, all slept naked in the same room; when the farmer cultivated his glebe and the secular priest gave alms and the ale-house was redolent with spicy anecdote; when the labourer was worthy of his hire, and the spindle and distaff were in good hands, and men lived on the earth and the fruits thereof, and gave thanks to their rulers and their God. For England was then a land of scattered castles and clustered huts, of bright pageantry and rude husbandry. There were swamps and fens and impenetrable thickets, and friars and highway-men used the same uncertain tracks from town to village. In the cities the houses were high-pointed and the streets were narrow and crooked. A lanthorn or a torch guided the steps of the night traveller, and the bellman sounded the hourly watches. Those were the days of the packhorse and the Morris dance, of bright liveries and coloured banners, when Henry VIII, scarcely eighteen years of age, succeeded his consumptive father to the throne of England.

Henry VIII's mother was one of the most beautiful women in England, and he inherited her likeness. Indifferent to Prince Arthur, it would appear that the graces favoured Henry abundantly. Fat as a dumpling, he exchanged his swaddling clothes for raiments of richer material and waxed fair and comely into youth. He was diligent and tactful and knew, as if by instinct, how to please others—including his religious grandmother. Delectable things continually dropped into his lap; but without difficulty he mastered several languages at an early age, excelled in mathematics and entered eagerly into religious disquisitions. He grew in stature and wisdom, charming his tutors and winning the admiration of his ministers. Many delighted in his music. The young men at court esteemed his athletics, while the young women praised his figure and were disarmed by his wit. He was an extrovert who liked people, and people liked him. He had the gift of making friends without losing dignity. Susceptible to the charms of women, and proud of his own legs, he had a quick eye for the shapely members of any young woman. He danced and tripped the stately Tudor measures to the sound of flute and viol. He coquetted gracefully with whom he chose and, anticipating Milton, would, when occasion permitted, "sport with Amaryllis in the shade". If Neaera appeared, he would no doubt run his fingers through her tangled locks as thoughtlessly as he might join his lips with those of some grateful lady-in-waiting.

Of leonine strength, Henry drew the best bow in England and jousted with superb courage. He loved the pleasures of the board, nor did he in any way despise those of the bed. His appetites were hale and he served them heartily. In the cadetship of his love he was assiduous. His queen was Spanish and accommodating; the royal tester was wide and richly curtained, and the night air was heavy with fragrant promises. But in spite of his good intentions and with every inducement to cleave unto Catherine, to the greater glory of matrimonial continence, there may have been fickle moods when he would desert the royal bedchamber for the desultory pallet of some pretty wanton whose lavish charms may have concealed the contagion of syphilis.

This is the most pressing query in the lives of the Tudors: Did Henry VIII contract syphilis and transmit it unknowingly to his wives and descendants? Is the "frontal bossing" thought to be apparent in Mary's portrait evidence of congenital syphilis? Was Edward VI, who died cachectic at sixteen, cursed with the same affliction? Some historians are inclined to think so, since this view has been seriously advanced by certain medical men. It is, of course, a plausible and superficially satisfying explanation of Henry's numerous matrimonial misfortunes in his search for a male heir. It throws a somewhat baleful light upon the rather rapid declension of Henry's health and his death in the middle fifties. It appears to account for certain features in Mary's miserable life and puts a new construction upon the prevailing sickness of Edward VI. But it is not above serious criticism. Much has to be inferred in order to make the diagnosis as decisive as certain writers have claimed. And it would appear that some of these later medical historians have jumped too readily—syphilis being what it is—at a popular and spectacular explanation without subjecting Henry's medical history, as may be found in contemporary records, to the naked scrutiny of impartial observation.

The loudest and most assertive advocate in the matter of Henry's syphilis was the late Sydney surgeon, Charles MacLaurin, who seemed to have studied history with the one thought of syphilis constantly on his mind. His popular books on historical figures abound in references to syphilis; and in his essay upon Henry VIII he literally left no stone unturned which might in some way indicate the presence of syphilis in that sorry sovereign. But MacLaurin was not the first in the field. Several hints about Henry's alleged syphilis had appeared in the medical Press long before MacLaurin had saddled his syphilitic hobby-horse. As early as 1888 Dr. A. S. Currie, in the *Edinburgh Medical Journal*, called attention to the repeated miscarriages of Henry's first two wives and the significance of parental syphilis. In 1913 Dr. James Rae, in his book "The Deaths of the Kings of England", came to the conclusion that the deaths of Henry VIII and Edward VI were primarily due to syphilis. Ten years later MacLaurin opened fire on the same subject in his two books "Post Mortem" (1923) and "Mere Mortals" (1925). His thesis was built upon the following premises:

1. The extraordinary number of premature births and dead children from two of Henry's wives, one of whom was young and healthy.

2. The poor health of at least three of his children, Mary Tudor, Edward VI and the illegitimate Duke of Richmond.

3. The terrible degeneration mental, moral and physical which set in, in his early middle life.

4. The facts contained in the extract from the *British Medical Journal* of 1910: "From being an able and athletic man he became a mass of loathesome infirmities. He was bloated in face and so unwieldy that he could hardly pass through an ordinary door. His legs were swollen and covered with festering sores, causing an unbearable stench."

5. The sinus on his leg which caused him unbearable agony whenever it was closed. This seems to have been syphilitic periostitis occurring in an essentially neurotic man.

6. Death in stupor at the comparatively early age of fifty-five.

"Not any single one of these symptoms", adds MacLaurin, "is indubitable evidence of syphilis, but taken together there is no other reasonable explanation."

This may sound convincing because of the specious finality about it, but medical opinion is not unanimous upon such a conclusion, nor is history so certain of the facts upon which the diagnosis is made. And there are some who regard MacLaurin as a syphilomane who, on account of his own obsession, has over-painted the lily,

a man with a mission, having been brought up in that pathological school where syphilis inspired awe, and where even fibrous tissue was often suspect. Medical opinion does not accept the dictum, to which MacLaurin subscribed, that syphilitic patients are generally "psychasthenic, ill-balanced and degenerate"; nor does it implicate syphilis, as MacLaurin did, in the ætiology of "phobias and obsessions".

Though history often guards her facts with a signal though annoying secrecy, many of Henry's deeds, both great and villainous, are deeply etched in the records of his time. Others may yet remain hidden in some forgotten State papers or lie in the undisturbed manuscripts of a private library. Though the known facts cannot be altered, and credible records appear indelible, interpretation may change with the improved and extended knowledge acquired in the process of research. But for those who would rely upon medical theory and clinical application in their elucidation of historical problems, it may be well to remember that medicine is not an exact science, and that the discovery of today is likely to alter the interpretation of yesterday. The literary "post mortem", fascinating though it may be to the curious, must, therefore, remain in the nature of a tentative assumption rather than a scientific declaration that has been amplified by the actual necropsy findings of the dead house.

Doctors disagree about Henry's syphilis because no one can know for certain whether he contracted it or not. No one can know whether his blood was tainted and his marrow corrupted by the spirochæte. Inference suggests that he contracted this disease betwixt the unlawful sheets of one of his peasant paramours before he came to the throne and at a time when venereal disease had spread in epidemic fashion throughout the whole of Europe. Inference assumes that he subsequently infected his wives; for in those unenlightened and unhygienic days where, in sexual commerce, the flesh became uncleanly excoriated, danger lurked; pustules and chancres concealed in the body's crypts and privy places were no less dangerous than when ulcers and rashes spread with noisome implacability over the common components of the human frame. It is also necessary to infer that Henry knew nothing of his pox'd condition and, therefore, sought no treatment for it; and that in spite of it he remained in good health and a good athlete for some twenty-six years. His contemporaries certainly did not think that Henry was infected, but that by his close association with Cardinal Wolsey he had run considerable risk of catching the disease from the great prelate who "knowing himself to have the foul and contagious disease of the great pox, broken out upon him in divers places of his body, came daily to your grace [Henry VIII], rowning in your ear, and blowing upon your most noble grace with his perilous and infected breath, to the marvellous danger of your highness, if God of his infinite goodness had not better provided for your highness".

Medical opinion favourable to the thesis of Henry's syphilis finds evidence chiefly in the number of miscarriages and stillbirths from which his first two wives suffered. Other facts lend some support to the implication; and yet there is evidence of a contrary nature from which explanations may be derived which seem in no way to affront the truth. These, though less spectacular, may ultimately appear more reasonable, and more in keeping with a prince than a profligate.

The fact that Henry took six successive women to his nuptial couch is not in itself evidence of any inclination to sexual promiscuity, although it may seem to imply it. Henry's character was complicated. He had the full measure of Tudor tact and determination. He could hardly be persuaded against his own judgement. His desires were paramount and he seldom relished the guiding opinion of others. He wanted a male heir, and he felt justified in searching for one from other wives than his first. There was in Henry a strong and sturdy love of the flesh-pots matched against a pricking religious conscience: an egregious imperiousness which chafed against the limits of self-discipline. But his prodigality was ever carefully directed; and though he may not always have kept within its bounds, he knew and respected conventional behaviour. His inclinations may have been adulterous, but his actions were generally circumspect. While so little is known for certain about Henry's extra-marital love-life, anything may have been possible. He may have been, both by desire and deed, the gay Lothario of his court. Those whose fancy delights in conjuring up the erotic possibilities of Henry's court will have no difficulty in imagining a doxy behind each door or a concubine concealed in every cubicle in his apartments. Nor will their imagination baulk at the vision of days in the royal barge, in the tilt-yard or at the chase ending with the dark hours spent in love's dalliance, tracing the naked outlines of a girl's warm flesh in the sentient atmosphere of love's euphoria. It may have been so; for while Henry remained king with an energetic appetite for pleasure and sensual delights, whose nods and becks had to be anticipated and obeyed, women were as likely a temptation as could have existed.

But did Henry behave in this way? Was he after all but a sceptered Sybarite with a modicum of musical talent and a quick temper? And did he, with a surge of April blood in his veins, meet kiss with kiss, ever in search of some fresh adventure of the flesh? It is unlikely. The known facts are against it; and such lechery is not in keeping with his character. He was not immune from temptation, it is true; but history records only three women who claimed Henry's sexual attention apart from his wives. These were Buckingham's married sister, Mary Boleyn and Bessie Blount, whose child Henry made the Duke of Richmond. A natural daughter, Etheldreda, is mentioned in the article on John Harington, in the "Dictionary of National Biography". She was the daughter of Joanna Dyngley or Dobson and was brought up as the natural daughter of the king's tailor, John Malte. But Frederick Chamberlin, by dint of much research into original documents from which the item is said to have originated, has proved it false. And there may be some significance in the fact that neither the astute Catholic historian Lingard, nor Froude nor Pollard even mention it.

Henry then, as the known facts demonstrate, had sexual relations with eight women during his lifetime—three concubines and five wives—if he were not already impotent when he married Catherine Parr. He vehemently denies that he had any sexual contact with Anne of Cleaves. In the matter of his alleged venereal disease inquiry is concerned only with Catherine of Aragon and one of Buckingham's married sisters about whom there was a court scandal in the first year of Henry's marriage and who was promptly dispatched to a handy convent some sixty miles from London. The remaining two mistresses, Mary Boleyn and Bessie Blount, did not enter Henry's life until after Catherine's last pregnancy when it was believed that she could no longer conceive. If, therefore, Henry infected Catherine with syphilis he himself may have contracted it from Buckingham's married sister or, as it has so often been presumed, from some other early lover unknown and unsung.

The number of Catherine's pregnancies appears to have been overstated in the past. This is not difficult to believe when her pregnancy record has sometimes been based merely upon the remark of some visiting ambassador that "the queen hath a fair belly"; and historians have accepted the implication without checking through other sources. Professor A. F. Pollard is inclined to offend in this way, perhaps because he had no medical interest in the queen's miscarriages; but as a recognized authority on Henry VIII it is not unnatural that his errors have been sedulously copied by later writers. MacLaurin makes no secret of his debt to Pollard, and, indeed, he bases his thesis upon "the extraordinary number of premature births and dead children" presented to Henry by his first two wives. Pollard, apparently by mistaking the christening of a ship for the christening of a son in an old and partly destroyed manuscript, states that Catherine gave birth to a son in 1514 which was no sooner christened than he died, and from the flimsiest evidence also asserts that in 1517 there were probably several miscarriages. In nine years from 1510 to 1518 nine pregnancies are attributed to Catherine, whereas, in fact, as Chamberlin points out,

there is historical evidence only of six, one of which resulted in the birth of Mary Tudor and the other in a son who lived for fifty-two days.

Having given birth to Elizabeth, who lived for almost seventy years, Anne Boleyn had three miscarriages before she was beheaded, and the last of these may have been induced by the shock of her husband's serious fall while jousting. Jane Seymour died after having given birth to a son who lived for sixteen years; and Bessie Blount, whom Henry courted secretly, had a son who died when he was seventeen. This is the entire history of Henry's known sex life. Of the twelve pregnancies five children were born. Catherine had four miscarriages, while Anne had two miscarriages and an abortion. Considering the times, the primitive state of medicine and midwifery and the complete absence of anything approaching ante-natal hygiene, this is not an unworthy record. It does not preclude the possibility of Henry's having contracted syphilis, but it hardly amounts to an "extraordinary number of premature births and dead children" which so firmly established the diagnosis of parental syphilis in the minds of MacLaurin and his predecessors.

The mystery of the recurrent miscarriage has not yet been fully elucidated. What was a puzzle to the sixteenth century physician is still a problem to the obstetrician of today. Unlike his ancestor, he no longer looks to the moon or to the stars for an explanation of the phenomena which perplex him. But as astrology has given place to biochemistry, there are still found women who seem unable to carry to the full term without displaying any known reason for this idiosyncrasy. It is well known that certain glandular disorders and vitamin deficiencies tend to produce repeated miscarriages. The toxæmias of pregnancy have the same tendency. Constitutional characteristics and organismal abnormalities have seemed in some cases blameworthy in the production of repeated premature births; and now marital incompatibility of the Rh factor in the blood is held responsible for the production of still-born children and miscarriages. This Rh factor is still the subject of medical research, but enough is already known to inculpate it as one of the chief causes of neonatal death.

In 1940 it was found that the injection of blood from Rhesus monkeys into rabbits and guinea-pigs led to the formation of antibodies in these animals which not only reacted with the red corpuscles of Rhesus monkeys but with 85% of the white population of mankind. The people who reacted in this way were designated Rh-positive and the remaining 15% of the population were regarded as Rh-negative. This Rh factor is genetically determined; the three genetic classes being homozygous Rh-positive, heterozygous Rh-positive and homozygous Rh-negative. And it has been found that when an Rh-negative woman marries an Rh-positive man danger threatens the resultant pregnancies because of the immunization factor between the Rh-negative mother and the Rh-positive fœtus. D. F. Cappell, writing on "The Blood Group Rh" in the *British Medical Journal* (November 2, 1946), says: "Rh incompatibility is, therefore, by far the most important genetic cause of fœtal death, *and it far outweighs congenital syphilis with which it used to be so often confused as a factor of neonatal mortality.*" (Italics mine.) He quotes a number of illustrative cases of which the following is typical:

Mother, Mrs. C., Rh-negative, father Rh-positive.
1931: miscarriage, two and a half months.
1932: female, full-time, stillbirth.
1934: miscarriage, two and a half months.
1936: female, full-time, stillbirth.
1938: male, full-time, lived two days, jaundiced.
1945: female, Rh-positive.

It has been noted that when the father is homozygous Rh-positive iso-immunization is more likely to occur, but neonatal deaths are still likely when the father is heterozygous. It is not uncommon for the first child of an incompatible Rh mating to be healthy, sometimes the second child also; then a series of miscarriages and fœtal deaths is likely to occur. Further research has yet to discover why some Rh-negative mothers react so quickly to the Rh antigen of the Rh-positive fœtus, and why others appear to be much more slowly influenced.

Syphilis is not the only key to the mystery of interrupted pregnancy. Factors, unknown in Henry's time, and scarcely past the verge of discovery in our own, operate with equal devastation to the fruits of wedlock.

In the lottery of marriage, Henry VIII may have been unfortunate in choosing two Rh-negative women for his first wives—as the tragic record of their pregnancies would seem to indicate. For, try as they might, neither Catherine nor Anne could alter the verdict of their genes. Hæmolytic disease blighted their hopes, as it eventually shattered their happiness. It caused Catherine's divorce and lost Anne her head. Incompatibility of the Rh factor brought successive sorrows to the marriage bed where even royal blood is subject to iso-immunization. Henry could do no more than his wives to rectify the hæmatic discongruity which yielded neither to prayer nor to incantation. Sovereign of his realm, he was the simple servitor of his chromosomes.

Records show that the ulcer which lodged upon Henry's leg first commenced to trouble him at the age of forty-six, and remained periodically troublesome, and at times very painful, until the day of his death at fifty-five. One or more sinuses existed which had to be kept open for the good of his health. If they closed Henry became racked with pain and suffered a rise of temperature. MacLaurin claims that this ulcer was due to syphilitic periostitis. Others, including the late Sir D'Arcy Power, believe that it was a callous ulcer which had begun as a varicose ulcer. The one condition is extremely common, the other comparatively rare. On the other hand the sinuses could have originated from an osteomyelitis caused by such an injury as may have occurred in 1536 when, clad in the heaviest armour, Henry fell from his horse while jousting and remained for two hours without speaking. Whatever the nature of the injury Henry sustained on this occasion, it is noteworthy that he never again jousted nor entered upon any active form of sport. From this time Henry's physical health gradually deteriorated, as has that of many an athlete when forced to retire from his wonted activities. Enforced lack of exercise and what would now be described as gluttony (though in contemporary records his habits were set forth as "marvellously excessive in drinking and eating") were the chief agents in the production of Henry's growing corpulence.

At fifty his bulk was such that, like Falstaff, he no doubt "larded the lean earth as he walked along". Sometimes he required the support of a staff to aid his ambulation. Later he had to be carried from room to room in a special chair supplied with poles which could be gripped by his attendants. This increasing fleshiness is unrelated to syphilis which is more likely to induce a cachectic state than one of increasing corpulence, except in certain cases of general paralysis of the insane where obesity increases with the dementia. But there is not the slightest evidence that Henry ever suffered from syphilis of the central nervous system. His grandiose ideas never lapsed into delusions. His petulance was never psychopathic, nor was his judgement grossly impaired. And though on occasions he was carried about in a special chair there is no indication that locomotor ataxia ever chained his heavy foot-fall to the earth or that girdle pains or gastric crises ever brought their torment. What mental changes may have occurred during the last few years of his life were much more likely to have been due to the insidious dementing tendencies of cerebral arteriosclerosis than any syphilitic involvement of his central nervous system. And if his death in a stupor at the age of fifty-five is regarded as being due to uræmia, one of the terminal extensions of arteriosclerosis, this disease is well known to occur in the non-syphilitic, especially where lack of exercise, worry and excessive eating and drinking are among the known ætiological agents.

In some ways Henry seemed to bear a charmed life. With a strong tuberculous inheritance he grew into a

young giant able to enjoy the roughest sports until he was forty-four. His illnesses until this time were few and of little account. He contracted neither the plague nor the sweating sickness which carried off so many of his subjects, some even from his own household. This luck may have held in regard to syphilis, if it is assumed that some of his early philandering, off the record, reached the stage of intimacy. Though syphilis was rife at the time, it cannot be imagined that every maid in the metropolis had contracted it; and reason is not outraged at the idea that the young prince, if and when he sowed his wild oats, may have been lucky enough in his contacts to have dodged infection.

All his life Henry was afraid of illness, and would often take elaborate precautions against the chances of contracting disease. He would move his court from palace to palace during the plague. At times he would travel with the fewest possible attendants and pass the days in some lonely hunting lodge, or shut himself up in a tower with his physician and take his meals alone. His attitude to sickness was almost superstitious. He was finical in treating himself for the most minor ailments and gave copious advice to the ailing in his court. Medicine was at one time his hobby; and with his physicians, Dr. Buttes and Dr. Chamber, he spent many hours compounding medicines and inventing liniments and cataplasms. Some of his recipes are still extant for "taking away itch" or "healing ulcers without pain", or the better known plaster made for Anne of Cleaves "to mollify and resolve, comfort and cease pain of cold and windy causes". Game with his gallipots and ingenious with his mixtures, Henry's nostrums were no better than those of his contemporaries, but enjoyed some temporary renown through their royal origin. Men, celebrated in their day, such as Thomas Vickary and Andrew Boorde, attended to Henry's medical and surgical needs, but have left no records relating to the king's syphilis. Had Henry ever imagined himself to be suffering from this disease he would certainly have undergone the traditional treatment which, in his day, consisted of sweating and the administration of mercury until the salivation was induced. It was a drastic treatment lasting several weeks, and sometimes it was necessary to repeat it. Furthermore, by the time Henry had reached the age of forty-six and was stricken with an ulcer on the leg, doctors had become adept at diagnosing syphilis and were of one mind in prescribing treatment. Such was their dread of this disease, and Henry's dread of all diseases, that, king or no king, he would have been introduced to magnanimous doses of mercury. And whether treated at this time or earlier in his life when Thomas Linacre was his physician, some record would have remained of it. Indeed, it would have been impossible, "in the fierce light which beats upon a throne", to hide it from the members of his entourage and the ambassadors—many of whom were merely gossip-mongers and spies—from foreign countries who so frequently stayed at his court.

Henry VIII was a remarkable man. He had great gifts and many accomplishments. His tremendous personality is part of England's heritage. In it there was good and evil and such a mixture of strength and weakness which renders him the more human. For a time it has been fashionable to concentrate on the weakness and ignore the strength, to magnify the faults and overlook the virtues—to judge this sixteenth century monarch by the standards of the twentieth century. This is unjust to the man who carried the sceptre more willingly than the sword. A prudent man and a staunch friend, Henry knew the temper of the people he ruled because he was essentially one of them. And though it might seem that he had

> "into monstrous habits put the graces
> That once were his,"

one must remember that soverignty does not imply perfection; and when the medical details of his life are being scrutinized, let it be emphasized that while Henry, who never aspired to wear the "white flower of a blameless life", may have been far from pure, the evidence is insufficient to conclude that he was pox'd.

RECENT OBSERVATIONS ON URIC ACID.

By Adolph Bolliger,

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Exactly one hundred and fifty years ago (1797) Wollaston[1] identified the crystalline deposits in the tophi of gouty subjects as urates. Since then a voluminous and sometimes confusing literature on the physiology of uric acid has come into existence, but the cause of these uratic deposits in gout still remains obscure. Furthermore, no answer has yet been found to the fundamental question of the fate of administered uric acid. Urates ingested by mouth cannot be traced in the body, and when they are injected intravenously only about 50% on the average reappear in the urine, while the fate of the other 50% remains obscure.

However, it has been established that in vertebrates the kidney is the most important organ for uric acid excretion. It has also been observed that two fundamentally different forms of nitrogen excretion exist: the so-called uricotelic metabolism with uric acid as principal end product and uric acid synthesis for this purpose, and the ureotelic metabolism with urea as its main end product. Birds, snakes and lizards excrete nitrogen mainly in the form of uric acid; they are uricotelic. However, all the mammals are uricotelic, but they are found to fall into two classes according to the manner in which they dispose the comparatively small amounts of uric acid produced by endogenous and exogenous metabolism. One of these two classes is said to have a low uricolytic index, whilst the other possesses a high uricolytic index. Man, the chimpanzee and the Dalmatian dog have a low uricolytic index; that is to say, most or all of the uric acid entering the circulation is excreted in the urine as such. The rest of the large number of mammals convert uric acid into allantoin by means of the enzyme uricase, and it is excreted as allantoin. These animals are said to possess a high uricolytic index.

It has further been stated that all mammalian tissues with the exception of the kidney are practically impermeable to uric acid and cannot be considered as likely storage places for this compound.[2] It therefore came as a surprise to find that frequently large amounts of urates are found in the integument and particularly in the keratinous appendages. Firstly, it was noticed that the skin beneath the distinctive brown sternal hairs of the male of the Australian possum, *Trichosurus vulpecula*, contained crystals of uric acid.[3] Next it was found that the hairs of the sternal region as well as from any other part of the pelage of this animal readily yielded uric acid when treated with hot water.[4] Quantitative determinations further brought out the fact that the uric acid contained in the hairs was many times greater than the total amount in the rest of the body.[5] Furthermore, the location of the hairs on the surface of the body seems to have an important bearing on the uric acid content. The hairs on the middle of the back of the common Australian phalanger or possum *Trichosurus vulpecula* contained about 70 milligrammes *per centum*, and the content steadily increased as the mid-line of the abdomen was approached. The region of the mid-line contained 240 milligrammes *per centum*.[6]

To judge from some twenty species tested, the high urate content of hair (10 to 500 milligrammes *per centum*) is by no means confined to primitive mammals such as marsupials, but is a characteristic of all hairy animals. Also all keratinous appendages including quills, horns, hooves, nails and claws have a uric acid content which in every instance tested so far is higher than that found in blood.[7] Skin was found to contain considerably smaller quantities than the hairs. This possibly may be due to the fact that the uric acid is confined to the keratinous elements of the epidermis, while the determination was made on the whole thickness of the skin. So far crystals of uric acid have been observed only in the sternal skin of the possum (*Trichosurus vulpecula*).

With reference to vertebrates with uricotelic nitrogen metabolism, it may be pointed out that it has been known for some time that the shed skin of snakes contains considerable amounts of uric acid. In addition, the feathers of ten species of birds were analysed in this laboratory, and it was found that the barbs of the feathers contained 30 to 120 milligrammes *per centum* of uric acid[3]—that is to say, five to 20 times more uric acid than was present in the blood.

The highest values so far observed in all animals examined were found in the hair of a herbivorous ureotelic mammal, the common rabbit, which contained as much as 500 milligrammes *per centum*. Nevertheless the urate content of blood and tissues of this animal is practically nil, mainly owing to the effective uricolysis brought on by the enzyme uricase. Strangely, however, the enzyme does not affect the uric acid deposited in the keratinous appendages of the rabbit. Adsorption of uric acid deposited by the sweat glands is not very likely, since this animal possesses no sweat glands. The question therefore arises whether this uric acid contained is keratin is connected in any way with purine metabolism or the gout problem as we know it.

There is much in favour of the idea that the uric acid of the integument is an integral part of the keratin molecule,[9] which consists mainly of amino acids. It was found to be present in every form of keratin tested so far; but in contrast to the amino acids it is only loosely bound and is readily removed by hot water, but cold water also dissolves an appreciable amount of the urates present. Admittedly, this water-soluble uric acid varies greatly from species to species; but this also applies to some of the amino acids which make up the keratin molecule. It should also be emphasized that there is no pronounced difference between the uric acid content of the feathers of uricotelic birds and the hairs, claws, *et cetera* of ureotelic mammals. This is somewhat unexpected, in view of the different end products of nitrogen metabolism in the two animal groups, and one could assume that uric acid was always synthesized when a fibrous denatured protein formed from the globular native proteins, such as albumin, globulin, *et cetera*. In this connexion it should also be mentioned that the hairs of avertebrates, such as caterpillars, contain significant amounts of upric acid (150 to 250 milligrammes *per centum*), as indicated by colorimetric methods.

On the other hand, the idea that the uric acid deposited in or on the keratin of the integument fulfils an excretory function is enticing. The continuous process of shedding of epidermis and hair by mammals or of feathers by birds certainly means that uric acid is constantly lost. Since nitrogen amounts to one-third of the uric acid molecule, nitrogen excretion in this form would be more effective than by means of amino acids, which average only about 14% nitrogen. However, if we assume that the uric acid in the integument has been deposited there because it could not be excreted otherwise, then the urate content of the keratinous appendages is of great significance with regard to purine metabolism, as is shown by the following example. The Muscovy duck, a water bird, was found to contain approximately 100 milligrammes *per centum* of uric acid in the barbs of its feathers; 30% of this uric acid seemed to be readily extractable by cold water, and a definite loss of uric acid could be demonstrated by immersing the wings of the living bird in cold water. This would indicate that a bird like the duck may lose up to 100 milligrammes of urates in twenty-four hours, provided this amount was available over such a period. In addition, the loss of urates by the process of shedding feathers particularly in the moulting season would further enhance this form of excretion. Similar concentrations would also apply in the case of the hairy mammals.

The experimental proof of a relationship between the uric acid administered and the uric acid content of the integument has not yet been achieved. For example, we have not succeeded in increasing the urate content of the hair of the guinea-pig by the repeated intraperitoneal injection of sodium urate. Further experiments along similar lines are in progress.

Uratic gout as occurring in human beings was mainly responsible for the numerous investigations on uric acid metabolism, and researches on the uric acid content of human hair should be of some interest. In the first place it has to be pointed out that man, together with the chimpanzee and the Dalmation coach hound, belongs to the small group of mammals with a small uricolytic index; that is, most uric acid entering the circulation of these species is excreted in the urine as such. The uric acid content of the keratinous appendages of these animals —10 to 30 milligrammes *per centum*—is low, and compared with rodents, canines, and felines they may be considered in a class of their own. This seems to be particularly striking in the case of the Dalmatian dog, because the hair of other canines contains about ten times as much uric acid as does the hair of this dog with a low uricolytic index. From an analytical point of view, however, man presents certain difficulties. With the exception of scalp and pubis, the human body is only sparsely covered by hair. Head hair is readily accessible, but it is constantly being interfered with by cutting, washing, oiling, drying, dyeing, singeing, waving and curling. Pubic hair, though much less abundant, is usually not exposed to these maltreatments. On the other hand, the question arises whether the absence of ordinary hygiene may vitiate analytical results.

In spite of these difficulties sufficiently constant results were obtained from about 50 analyses of head and pubic hairs of normal and diseased males and females to allow some deductions. In normal subjects of both sexes, the amounts of uric acid extracted by hot water varied from seven to 15 milligrammes *per centum* as indicated by colorimetric determinations. Pubic hair, particularly in females, yielded somewhat higher values than head hair. High normal values as well as definitely increased uric acid content were sometimes found in the pubic hairs of patients suffering from long-standing renal insufficiency or leuchæmia, and of pregnant females suffering from toxæmia of pregnancy; but the small number of patients examined did not allow any conclusions.

So far no opportunity presented itself to determine the uric acid content of the hair of subjects suffering from moderately severe or severe gout, and I should be grateful to medical practitioners who could supply me with samples of hair (0·5 to 2·0 grammes approximately) from gouty patients. Mild chronic gout, as observed in two elderly males, did not seem to have any influence on the uric acid content of the hair. However, it may be possible that no connexion exists between the gout problem and the comparatively large amount of uric acid discovered in the keratinous integument, and it should be emphasized that the pathological uratic deposits are found in the cartilage and not in the epidermis.

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PERICARDITIS AND PERICARDIAL ADHESIONS.

By J. B. CLELAND,
Marks Professor of Pathology, University of Adelaide.

IN the course of 6,000 autopsies at the Royal Adelaide Hospital between 1920 and 1946, there were 150 (2·5%) subjects showing pericarditis, and 153 (2·5%) other subjects showing pericardial adhesions, indicating that they had previously suffered from pericarditis. Thus 5% of these persons had previously had pericarditis, or still had pericarditis at the time of their death.

The cases of pericarditis may be grouped into the following categories: (i) those the result of bacterial invasion or other fairly obvious infective process; (ii) those the secondary result of infarction of part of the heart muscle; (iii) those due to some unknown (presumably biochemical) irritant, not infrequently occurring in the later stages of chronic nephritis.

Pericarditis due to Infections.

In 77 cases (1·3%) the pericarditis was due to an infection.

Tuberculous Pericarditis.

In two cases the pericarditis was tuberculous and due to extension from a neighbouring infection. In another case, a quarter-caste aboriginal girl, aged fourteen years, with caseous mediastinal glands, lesions in the lungs and tuberculous peritonitis, had "bread-and-butter" pericarditis which may have been tuberculous.

Pericarditis Secondary to Pulmonary Infections.

Forty-eight of the remaining 147 cases were associated with lobar pneumonia (18), with empyema or purulent pleurisy (22), with abscess of the lung or with some other pulmonary infection, and the pericarditis can reasonably be attributed to an extension from these adjoining lesions in the respiratory tract, or at least to infection from them. In two of these cases the pericarditis was associated with foul empyemata, containing spirochætes and fusiform bacilli, following abscesses of the lungs, which were themselves probably secondary to an oral condition such as the removal of teeth. Another case was associated with an empyema which was secondary to a suppurating hydatid cyst of the liver. Sixty-eight ounces of pus were present in the pleural cavity of a man, aged seventy-two years, who had a perforated duodenal ulcer and a secondary subphrenic abscess with early pericarditis. One patient had fractured ribs and lobar pneumonia, and in this case it is interesting to speculate whether the pneumonia was secondary to the trauma or independent of it.

Pericarditis with Mediastinitis.

A male subject, aged forty-two years, with a nutmeg liver, had purulent pericarditis "and consecutive mediastinitis".

Pericarditis with Staphylococcus Aureus Infections.

There were seven cases of pericarditis associated with *Staphylococcus aureus* infections elsewhere, and obviously part of a general pyæmia. The lesions elsewhere were as follows: infection of the lips and face; infection following a rash due to potassium iodide; *Staphylococcus aureus* foci in the lung; infection of the dorsal vertebræ; a carbuncle in a diabetic; an infection of the forearm in a diabetic.

Pericarditis with Meningococcal Meningitis.

In two cases of meningococcal meningitis pericarditis was present, and in one it was stated to be pneumococcal.

Pericarditis with Puerperal Infection.

In two cases the condition was puerperal, in one case associated with vegetations on the septum of the heart and in the other following abortion.

Pericarditis with Bacterial Endocarditis.

There were three examples of pericarditis with bacterial endocarditis, including the one already mentioned under puerperal infections.

Pericarditis with Amœbic Dysentery.

In one case an amœbic abscess of the liver ruptured into the pericardium with a fatal result. In another case, that of a man, aged sixty-six years, a left subphrenic abscess was present containing two pints of pus, and one pint of pus was found in the pericardial cavity.

Pericarditis with Other Acute Infections.

There were four cases of pericarditis associated with other acute infections. In one it was associated with a streptococcal skin rash. In another, that of a woman, aged fifty-nine years, in whom hæmolytic streptococci were present, together with infective foci in the kidneys and bilateral smoky keratitis, pericarditis was also present. The two other cases were indefinite.

Pericarditis Secondary to Abdominal Infections.

There were seven cases of pericarditis secondary to abdominal infections. Four were associated with subphrenic abscesses, two of which have already been mentioned. In a second case pericarditis followed a ruptured duodenal ulcer. The fourth case was that of a man, aged sixty-five years, with a ruptured appendix. The other three cases comprised one of pelvic abscess, one of infection of the kidney secondary to carcinoma of the bladder, and one of peritonitis associated with hypertrophy of the heart.

This gives a total of seventy-seven cases of pericarditis in which the condition was either due to bacterial organisms or secondary to protozoal infections.

Pericarditis due to Cardiac Infarction.

In only fifteen of the 150 cases was the pericarditis due to infarction of the heart muscle, the total number of such infarctions being 127. In the 6,000 post-mortem examinations, probably a number of the other subjects had slight and unrecorded pericarditis over the infarcted area. Pericarditis would be expected only when the infarction extended to the serous coat.

Pericarditis due to an Irritant.

Pericarditis with Subacute or Chronic Nephritis.

Thirty-five of the 150 cases of pericarditis (23%) occurred in the course of subacute or chronic nephritis. In 21 of these the presence of uræmia was recorded; in the other 14 the patients had hypertrophy and dilatation of the heart, which were the cause of death without obvious clinical uræmia. Amongst the uræmic patients with pericarditis were two women, aged respectively twenty-three and twenty-eight years, and a man, aged thirty-two years.

Pericarditis with Leuchæmia.

Two subjects with myeloid leuchæmia had pericarditis.

Pericarditis with Syphilitic Aortitis or Aneurysm, the Heart being Hypertrophied.

In eight cases pericarditis was present in subjects with syphilitic disease of the aorta, in one of whom carnification in the lung was also present. It is not at all clear why pericarditis should occur in these cases. However, their number suggests that there is an association between the two conditions.

Pericarditis Associated with Various Lesions.

There were thirteen unclassified cases, in one of which calcified aortic cusps were present.

Results.

These results may be tabulated as in Table I.

Milk Spots on the Pericardium.

Milk spots or patches are frequently found on the surface of the front of the heart. They are undoubtedly

the effects of friction and pressure and equivalent to corns. Over the course of the coronary arteries white streaks may sometimes be seen, due to the same cause, the distension of the vessel causing the part to project. The view that these milk patches are the aftermath of true pericarditis is in my opinion incorrect, or at any rate, this is a rare cause, though I have seen occasionally a tag of a broken adhesion projecting from a milk patch.

TABLE I.

Type of Pericarditis.	Number of Subjects.
Tuberculous	2
Secondary to pulmonary infections	49
Secondary to staphylococcal infections	7
Due to other infections	19
Secondary to cardiac infarction	15
Associated with nephritis	35
In leuchæmia	2
In syphilitic aortitis or aneurysm with hypertrophied heart	8
With various other conditions	13
Total	150

Pericardial Adhesions.

Pericardial adhesions were present in 153 cases (2·5%). In 33 of these, old rheumatic valvular disease of the heart was present, and in another case there was a previous history of rheumatism with cardiac hypertrophy but no valvular disease. The following were the valvular defects associated with pericardial adhesions (Table II):

In 15 out of the 50 cases of universal pericardial adhesions, valvular disease of rheumatic origin was present, or (in one case) a rheumatic history with an hypertrophied heart.

TABLE II.

Associated Valvular Defect.	Number of Subjects.
With mitral disease	17
With mitral and aortic disease	7
With mitral and tricuspid disease	2
With mitral, aortic and tricuspid disease	2
With aortic disease	5[1]
Total	33

[1] One man, aged 70 years, with a calcified aortic valve.

The other examples of adhesions were associated with chronic lung conditions (such as pneumonia with abscess cavities, old empyema and fibrosis, carcinoma with extension to the pericardium, silicosis or fibrosis of the lungs), or with hypertrophy of the heart with or without chronic nephritis; but in a number the accompanying lesions were miscellaneous and apparently had no bearing on the pericardial adhesions.

The universal pericardial adhesions present in 50 out of the 153 cases were nearly always accompanied by pleuritic adhesions, often extensive. Thus these were present in 12 out of 13 examples in the last thousand post-mortem examinations, the subject in whom there were no pleuritic adhesions being a man, aged forty-three years, with calcified knobby aortic cusps (evidently post-rheumatic).

Summary.

1. Active pericarditis was present in 2·5%, and pericardial adhesions in a further 2·5%, of 6,000 autopsies at the Royal Adelaide Hospital.

2. Of the 150 cases the pericarditis was associated with pulmonary infections in 49, with nephritis in 35, with cardiac infarction in 15, with staphylococcal infections in seven and with syphilitic aortitis in eight. In only two cases was it tuberculous.

3. The 15 cases of pericarditis associated with cardiac infarction occurred in 127 cases of this condition. Doubtless some slight examples were not recorded; but it is probable that pericarditis in cardiac infarction is less common than is usually assumed.

4. Milk spots on the pericardium are assumed to be the results of fibrosis following friction, and rarely, if ever due to true pericarditis.

5. In 34 of the 153 cases of pericardial adhesions there was evidence of rheumatic disease of the valves, or (in on case) a rheumatic history.

6. In 15 of these 34 rheumatic cases the adhesions of the pericardium were universal. There were 50 examples of such *synechia pericardii* among the 153 subjects with pericardial adhesions.

CANCER STATISTICS FROM THE ROYAL PRINCE ALFRED HOSPITAL, SYDNEY.

By H. H. SCHLINK, CLEMENT L. CHAPMAN AND FREDERICK N. CHENHALL,
Sydney.

THE incidence of cancer in general has rapidly increased, mainly owing to a rising expectation of life, which results in a greater proportion of the population reaching and living through the cancerous age periods. In America cancer held about tenth place among the causes of death in 1900. With an aging population it rose to fourth place in 1920, and since 1930 it has taken second place in mortality tables. These facts have led to unjustified pessimism with regard to the successful treatment of cancer, not only among the general public, but also among medical men not specializing in the treatment of this disease.

Although it is admitted that the results of treatment are not yet ideal, still greater progress in the treatment of cancer has been made in the past thirty years than in all the preceding centuries, owing not only to research and to the clinical pathologist, who has learnt to recognize the different types of cancer cells and to grade them according to rate of growth and spread, but to the specialists who have attacked the disease with more modern and adequate methods of treatment. Improvement in radical surgery technique has played a major part in the progress of treatment. Besides the cautery, the innovation of surgical diathermy has added fulguration and coagulation to the methods of cancer cell destruction, and finally the selective effects of irradiation by radium and deep X rays have improved steadily during the past three decades, in virtue of the determination of its more accurate dosage.

The complex problem of cancer cannot be solved by fanatical adherence to one type of treatment, but only by the proper correlation of the different specialities involved and by a majority decision with regard to the best treatment or combination of treatments for each individual patient.

It is regrettable that at most hospitals in this country the conference system has not been adopted; by this the patient appears before a committee composed of a surgeon, a physician, a pathologist, a specialist in the diseases of the part affected and a radiotherapist, before the most suitable form of treatment is decided upon.

Although several pre-war cancer conferences were held at Canberra (from which, by the way, the surgeon, the physician and pathologist mostly absented themselves, the field being left to the radiotherapist), at no time have all branches of the medical profession met to consider the many excellent forms of combined treatment and to give to the sufferers the results of their pooled knowledge. It is to be hoped that the next cancer conference will see these persons present and willing to cooperate so as to determine the best methods by which this mortal disease can be attacked.

TABLE I.

Five Year Cure Rate, Cancer of the Cervix Uteri, 1930 to 1940.
Comparison between latest figures from the Holt Institute, Manchester, and the Royal Prince Alfred Hospital.
(Books closed 1943 and 1945 respectively.)

Condition of Patients.	Five Year Statistics, Royal Prince Alfred Hospital, 1930 to 1940 inclusive.[1]		Aggregate Figures from 16 World Centres. (Bourne and Williams.)		Holt Institute, 1934 to 1938 inclusive.	
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.
Patients examined with a view to treatment	371	—	9,051	—	899	—
Patients treated; all diagnoses microscopically proved	357	96·2	7,958	87·8	826	91·6
Alive without recurrence after five years	111	31·0	2,194	27·6	214	25·9
Alive with recurrence after five years	2	0·5	128	1·6	8	0·96
Died of cancer	214	59·9	5,368	67·5	572	69·2
Died of intercurrent disease	11	2·9	163	2·0	21	2·5
Lost or not followed up	19	5·1	105	1·3	11	1·3
Five year cure percentage among all patients examined	317	29·9	9,051	24·2	899	23·8
Five year survival rate amongst all patients examined	—	30·4	—	25·5	—	24·6
Five year cure rate amongst all patients treated	—	31·0	—	27·6	—	25·9

[1] Through lack of funds and staff 19 of our patients were lost in the follow-up. If all patients both here and at the Holt Institute eventually reported, our five year survival rate percentage would be 37, as against the Holt Institute's 28.

The main strength of cancer is its insidious onset, which prevents early successful treatment. Time is lost before the patient consults a medical practitioner, who further delays sending the patient to a specialist in cancer treatment. This is understandable, because most text-books give symptoms and signs of advanced cancer only.

Education of the public and of the medical student is the answer—education of the public by the introduction of lay cancer societies, and education of the medical student later by the concentration of cancer clinics in close proximity to medical schools. The recent innovation in America of the cancer prevention clinic has led to good results. Among the first 1,000 women examined in Philadelphia, three cancers of the cervix were found, and at the first 2,105 examinations of the breasts, five cancers were discovered. All were cured by early treatment. It is doubtful if in this country the medical profession has sufficient manpower to perform complete physical examination of all the citizens; but to attempt it is a move in the right direction, and should at least be carried out in the larger centres of population.

TABLE II.

Ten Year Cure Rate, Cancer of Cervix Uteri, 1930 to 1940, the Royal Prince Alfred Hospital.

Condition of Patients.	Ten-Year Statistics.	
	Number.	Percentage.
Patients examined with a view to treatment	197	—
Patients treated; all diagnoses microscopically proved	188	95·4
Alive without recurrence after ten years	41	21·8
Alive with recurrence after ten years	1	0·5
Died of cancer	125	66·5
Died of operation (84 subjected to operation)	2	2·4
Died of radium treatment (104 treated)	3	2·9
Died of intercurrent disease	8	4·3
Lost sight of	8	4·3
Ten year cure rate amongst all patients examined	197	20·8
Survival rate of all patients examined	—	21·3
Ten year cure rate amongst all patients treated	188	22·3

Modern methods of treatment have yielded more satisfactory results than is generally realized. Recent statistics of 36,000 cases of cured cancer, in which treatment consisted of surgical removal, irradiation or a combination of both these methods, have been collected by the American College of Surgeons. These patients have been free of all evidence of cancer for at least five years since treatment. Even those victims of cancer doomed to die can, if adequately treated by modern methods, be relieved of much pain, hæmorrhage and foul discharge; they have as much right to adequate treatment as the diabetic, the patient with chronic heart disease or the arteriosclerotic patient.

The treatment of cancer requires the specialized knowledge of every branch of medicine, and therefore any future clinics formed should be in close relationship with a parent clinical hospital. The recent move to make cancer institutes separate and distinct and far removed from existing hospitals should be frowned upon. There is not a department in general hospitals that fails to deal with one or other aspects of the cancer problem, and it would be impossible to concentrate the same weight of knowledge in separate institutes. Above all, the medical student should be thought of, as it is only through him that the early diagnosis of the disease can be improved. After a serious consideration of the problem, we are of the opinion that the institute proposed to be built in this city must be in close relationship to a parent hospital and as close as possible to the research laboratories of the University of Sydney.

TABLE III.

Cancer of the Cervix Uteri, First, Second and Third Stages, Five and Ten Year Cures; Royal Prince Alfred Hospital.[1]

Duration of Cure.	Type of Treatment.	
	Radium and Surgery.	Radium Alone.
Five years	54%	14%
Ten years	44%	8%

[1] Fourth stage cancers are mostly beyond any effective treatment. Table III excludes this group and gives the results of treatment by the combined method and by radium alone in the first, second and third stages of cancer growth in the *cervix uteri*.

Since 1930, we have consistently followed out the combined treatment of cancer of the cervix with radium followed by surgery wherever possible. The usual procedure is a dosage of 7,000 milligramme-hours, 30 milligrammes screened by one millimetre of platinum in the uterus and 40 milligrammes screened by two millimetres of platinum in the vagina; this treatment is followed by Wertheim's radical hysterectomy five weeks later. Our operability rate over all cases is 49%.

We have already published our five and ten year statistics up to 1938. Now we wish to place on record figures brought up to and including 1940. Next year we shall be in a position to give our fifteen year cases. We should like to state that the gynæcologists of this hospital

are strongly of opinion that only those who have special gynæcological knowledge are competent to apply radium in the pelvis. It is necessary that ovarian tumours and pus in the Fallopian tubes be diagnosed and dealt with before radium application, and the application itself needs a thorough knowledge of the pelvic organs and their abnormalities. Only trained gynæcologists are capable of carrying out the pelvic radium technique in a proper and efficient manner. We concede that the physicist may know more about dosage and screenage, but clinically he is usually incompetent.

As advocates of the combined treatment by radium and surgery whenever the latter is possible, we believe that the better results obtained by this means over those of radium treatment alone are due in great measure to the extirpation of the lymphatic glands, which in our experience are involved in about 20% of cases in which operation is performed. We have had ample proof that radium and deep X-ray therapy are not effective in invaded lymphatic tissue.

Our results are set out in Tables I, II and III.

Acknowledgement.

We acknowledge indebtedness to Miss Cunningham, the secretary of the department.

NUTRITION SURVEY OF TASMANIA: I. FOOD CONSUMPTION AND DIETARY LEVELS IN THE SPRING OF 1945.[1]

By THELMA J. NORRIS,[2]
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THE food consumption survey carried out in all States of the Commonwealth of Australia in 1944[(1)] revealed that the mean daily intake of certain nutrients in the households investigated in Tasmania was considerably below the mean intake of these nutrients in households surveyed in all other areas in Australia. The difference was most outstanding in the intake of the nutrients calcium and vitamin *C*.

In the spring of 1945 further investigations were undertaken in Tasmania. These included (*a*) a second food consumption survey to ascertain whether the lower level of nutrient intake was peculiar only to the previous year; (*b*) a medical examination of the children of the metropolitan households participating in the survey, special attention being directed to the signs and symptoms of deficiency diseases; (*c*) the determination of the plasma ascorbic acid levels of these children.

The results of the 1944 survey have been reported[(1)] while Clements[(2)] has discussed certain features of the food production pattern of Tasmania. The results of the medical examinations and plasma ascorbic acid determinations will be the subject of a further communication.[(3)]

The purpose of this paper is to give some details of the food consumption and dietary levels found in Tasmania during the survey carried out from early September to late November, 1945, and to draw some comparisons with the data obtained in Tasmania and the whole of Australia (including Tasmania) in the previous year.

PROCEDURE.

For the second survey every effort was made to obtain conditions similar to those which existed in the previous year. Households in Hobart and Launceston were investigated again. Country towns different from those covered in 1944 were selected, but the districts of the "paired" towns were similar in their economic and agricultural aspects, with one exception. The towns investigated in 1945 were Scottsdale in the north, St. Mary's in the east, and Huonville, Geeveston, Cygnet, and Franklin in the Huon Peninsula. None of the towns have the peculiar food difficulties encountered in Queenstown, surveyed in 1944. The 1945 survey was made in the same season of the year. The methods adopted for the selection of households, collection of data, and statistical treatment of the material were identical with those used in the 1944 survey.[(1)] The war had ended when the 1945 survey was undertaken, but only a short time had elapsed since the cessation of hostilities, and no relaxations in the stringency of home conditions had become apparent.

RESULTS.

The survey conducted in 1945 showed that the mean weekly food consumption and mean daily intake of nutrients compared closely with those observed in 1944.

I. Consumption of Foodstuffs by the Households Covered by the Survey.

The most marked change in consumption occurred in the dairy produce group—the mean daily *per capita* intake was higher in 1945 than in 1944, and was equal to the all-Australian average obtained in 1944. The improvement was mainly due to the high consumption of milk in country areas, especially St. Mary's. Hobart actually showed a decreased milk consumption.

There were considerably more potatoes consumed in 1945 than in 1944, but less vegetables other than potatoes. The mean consumption of tomatoes in Tasmania was only 11% of the mean level for all Australia, of citrus fruit a little more than 50%, and of fruit other than citrus less than 50%.

The consumption of cereals, though lower in 1945 than 1944, mainly due to a drop in consumption of bread, was still higher in Tasmania than in the other States. Also the mean Tasmanian potato consumption was greater than the mean Australian consumption.

II. Mean Daily Intake of Nutrients for Each Area.

The mean daily *per capita* intake of Calories and specific nutrients in all areas surveyed in 1945, is shown in Table I together with 1944 Tasmanian and all-Australian figures. Comparison shows that the position in 1945 was practically identical with that of 1944. However, there was an improvement in the intake of calcium, but this was not reflected in all areas, the mean for households in Hobart and the Huon being 16% below the average. Hobart showed the lowest vitamin *A* intake, being 10% below the average, and the 1945 intake was 25% lower than the 1944 level. (However, the knowledge of vitamin *A* content of different foods and the human requirements of the nutrient is still incomplete, so the significance of this decrease cannot be competently discussed.) It will be noticed that the 1945 vitamin *C* intake was less than the 1944 and that the Tasmanian figure is appreciably below the Australian figure.

III. Mean Daily Intake of Nutrients Compared with Recommended Allowances for Each Area.[1]

The mean *per capita* intake of Calories and specific nutrients, with the exception of calcium, was in excess of the mean *per capita* recommended allowances for each area surveyed. (See Table II.) The intake of calcium

[1] This survey was carried out under the direction of Dr. F. W. Clements, Director, Australian Institute of Anatomy, Canberra.

[2] The following students of the 1945 School of Nutrition, Australian Institute of Anatomy, Canberra, participated in the survey, visiting the households and assisting the housewives in the recording of the information required: Misses E. Campbell, G. Davies, L. Davey, H. Gloster and M. Honey.

[1] The basis for the recommended allowances used in this comparison is the recommended dietary allowances, National Research Council Report and Circular Series Number 115, 1943, Washington, D.C. In place of the full recommended intake level of specific nutrients, the restricted intake has been used as in the "Report of a Joint Committee of Australian and United Kingdom Officials on Food Consumption Levels in Australia and the United Kingdom" (Commonwealth Government Printer, 1945). The revised (1945) edition of the "National Research Council Recommended Allowances" was not used, as the same procedure as for the 1944 survey[(1)] had to be adopted to validate comparisons between the two years. From these tables a *per capita* scale of recommended allowances of all nutrients for each household and each area was established.

TABLE I.

Mean Daily Intake per Capita of Calories and Specific Nutrients, Tasmania, 1945. Comparison with Tasmania, 1944, and "All-Australia", 1944.[1]

Area.	Number of Households Investigated.	Protein. Grammes.	Fat. Grammes.	Carbohydrate. Grammes.	Calories.	Calcium. Milligrammes.	Iron. Milligrammes.	Vitamin *A*. International Units.	Vitamin B_1. Milligrammes.	Vitamin *C*. Milligrammes.
Hobart (1945)	44	81	90	351	2596	582	14·15	3330	1095	75
Launceston (1945)	42	83	89	361	2647	700	14·10	4180	1137	80
Tasmania Metropolitan (1945) ..	86	82	90	356	2621	640	14·16	3700	1116	78
Tasmania Metropolitan (1944) ..	70	85	90	362	2663	618	14·40	3780	1117	79
Huon (1945)	37	83	91	356	2646	586	14·90	3500	1155	77
St. Mary's (1945)	19	99	121	403	3183	1016	14·90	3970	1364	65
Scottsdale (1945)	20	85	97	355	2710	800	14·05	3640	1143	80
Tasmania Country (1945)	76	88	100	368	2797	750	14·68	3650	1204	75
Tasmania Country (1944)	134	83	88	356	2619	625	13·90	3660	1101	86
Total Tasmania (1945)..	162	85	95	362	2704	692	14·41	3699	1157	77
Total Tasmania (1944)..	204	83	89	358	2634	623	14·07	3701	1107	84
All Australia (1944)	2730	82	93	341	2597	714	13·90	3890	1078	97

[1] The figures for 1944 are in italics.

fell below the recommended allowance by varying amounts in all areas with the exception of St. Mary's. This is the only area investigated in Australia to show a calcium intake above the mean recommended allowances.

Although the vitamin *C* intake figure was above the recommended allowance, it must be appreciated that in the food composition tables used, no allowance was made for losses due to transport, storage and cooking of food. In Tasmania the chief source of vitamin *C* was vegetables, and thus the loss would be relatively greater than in an area where a higher proportion of the vitamin was obtained from citrus fruit and tomatoes. It is possible then, even probable, that in some parts of Tasmania the intake would be below the mean recommended allowance.

IV. Relation of Intake of Nutrients to Recommended Allowances in Individual Households.

Consideration of mean intake of an area as a whole and comparison with the mean recommended allowance mask the position in individual households. The data arranged to show the percentage of households in each area which fell below the recommended allowance (Table III), demonstrate that for a number of nutrients a considerable proportion of households in each area failed to reach the recommended allowance. It will be noticed once more that the results for 1944 and 1945 compare closely. The greatest difference was in the figure for calcium and vitamin B_1 in country districts—in both cases fewer households fell short of the recommended allowances in 1945 than in 1944. The improved milk consumption in country areas would account for the difference in both these nutrients.

Table III shows that in the various areas there was a fairly wide variation in the percentage of households whose intake was lower than the recommended allowance. The figure for Calories and protein was low, and the amount by which the households fell short of the recommended allowance was also small, except for one household in Hobart. This family was 28% below requirement in Calories and 20% below in protein.

Table III shows that in all areas a high percentage of households consumed less than the recommended allowance of calcium. Several households obtained less than 50%, and one obtained only 22% of the recommended allowance. The mean percentage by which the households fell below the recommended allowance was higher in Hobart than in any other area, and considerably higher in the Huon than in the other country areas (see Table IV).

Table IV again shows the improvement in the calcium position in 1945 over 1944, especially in the country areas.

A large proportion of households failed to obtain the recommended allowance for vitamin *A* and vitamin B_1, especially in Hobart (Table III). The mean percentage by which the households fell short of the recommended allowances of these two nutrients was also greatest in Hobart.

The percentage of households in which the intake failed to reach the recommended allowance for vitamin *C* was relatively small, but it must again be remembered that the intake figure makes no allowance for probable loss before consumption.

V. Grading of Household Diets.

When the households are graded according to their dietary level by the arbitary scale used in the 1944 survey,[c] it is seen (Table V) that there was a high percentage with lower grade (*D* grade) diets, especially in Hobart, Launceston and the Huon. St. Mary's, with 63% of its households receiving A grade and 16% D grade diets, is in marked contrast with Hobart which has 14% A grade and 41% D grade diets.

VI. Comparison of City and Country Areas.

Again as in 1944, the country areas of Tasmania showed higher consumption levels than the metropolitan, except for vegetables and tomatoes. The 1945 country results

TABLE II.

Comparison of Mean Daily Recommended Allowances and Mean Daily Intake of Nutrients per Capita in all Areas. Tasmania, 1945.

Area.	—	Protein. Grammes	Calories.	Calcium. Milligrammes.	Iron. Milligrammes.	Vitamin *A*. International Units.	Vitamin B_1. Milligrammes.	Vitamin *C*. Milligrammes.
Hobart ..	Average recommended allowances	61	2278	828	9·20	3111	1081	55
	Average intake	81	2596	582	14·15	3330	1095	75
Launceston	Average recommended allowances	60	2253	803	8·26	3316	1048	53
	Average intake	83	2647	700	14·10	4180	1137	80
Huon ..	Average recommended allowances	58	2129	835	8·80	3213	995	52
	Average intake	83	2646	586	14·90	3500	1155	77
St. Mary's	Average recommended allowances	58	2103	847	8·81	3201	988	52
	Average intake	99	3183	1016	14·90	3970	1364	65
Scottsdale ..	Average recommended allowances	60	2268	813	9·09	3379	1063	54
	Average intake	85	2710	800	14·05	3640	1143	80

TABLE III.

Percentage of Households Falling Below Recommended Allowances in Calories and Specific Nutrients.

Area.	Number Surveyed.	Protein.	Calories.	Calcium.	Iron.	Vitamin *A*.	Vitamin B_1.	Vitamin *C*.
Hobart (1945)	44	6·8	29·5	79·5	0	65·9	47·7	25·0
Launceston (1945) ..	42	2·3	9·5	71·4	0	42·8	45·2	16·6
Metropolitan (1945) ..	86	4·6	19·7	75·5	0	54·6	46·5	20·9
Metropolitan (1944) ..	70	1·4	18·5	81·4	1·4	55·7	45·7	20·0
Huon (1945)	37	2·7	13·5	86·4	0	35·1	24·3	21·6
St. Mary's (1945) ..	19	5·2	15·7	31·5	5·2	31·5	10·5	15·7
Scottsdale (1945) ..	20	5·0	15·0	60·0	0	45·0	25·0	10·0
Country (1945)	76	3·9	14·4	65·7	1·3	36·8	21·0	17·1
Country (1944)	134	4·4	17·1	84·3	2·2	41·0	40·2	23·8

showed improvement over 1944 in intake of all nutrients except vitamin C. The difference between metropolitan and country and between 1945 and 1944 was due mainly to the higher average consumption of dairy products in country areas, brought about by the high consumption of milk in St. Mary's (11·62 pints per adult male per week). Of the households surveyed in that township 68% had a cow.

VII. Comparison of Country Areas.

The data analysed in each way showed St. Mary's to have the most satisfactory dietary pattern of all areas surveyed, with the single exception that the vitamin C intake there was lower than in some other areas.

The households surveyed in another country area, the Huon, considered to be a rich fertile district, compared most unfavourably with those investigated in St. Mary's. The mean weekly consumption of milk there was 5·55 pints per adult male, and the calcium intake in the individual households and the total area fell well below the recommended allowances. Of the Huon households surveyed 27% had a cow.

TABLE IV.

Mean Percentage by which Households in Each Area Fell Below Recommended Allowance for Calcium.

Area.	Number of Households.	Mean Percentage below Recommended Dietary Allowance.
Hobart	35	35·8
Launceston	30	29·3
Huon	32	31·1
St. Mary's	6	29·5
Scottsdale	12	17·0
Metropolitan (1945)	65	32·8
Metropolitan (1944)	57	34·9
Country (1945) ..	50	27·5
Country (1944) ..	113	34·9

VIII. Comparison of City Areas.

Of the two cities surveyed, Hobart and Launceston, the former had the lower consumption level, especially of the protective foods. The milk consumption of 4·97 pints per adult male per week in Hobart was the lowest of any area. A larger percentage of households failed to reach the recommended allowance for specific nutrients in Hobart than in any other area, and once again, as in 1944, this metropolis had the highest percentage of low grade diets.

DISCUSSION.

A number of factors may operate to affect the dietary pattern of various areas. Perhaps the three most important are the availability of supplies, the amount of money available for expenditure on food, and the degree of knowledge on the part of the general public and the housewives as to what constitutes a balanced diet.

Expenditure on Food.

The amount per "adult male" unit spent on food in each individual household has been calculated from the records. Table V shows the frequencies for amounts spent on food and the mean weekly expenditure for all areas. It will be seen that the expenditure was highest in the area with the greatest percentage of A grade diets (St. Mary's) and lowest in the area with the greatest percentage of D grade diets (Hobart).

On an average the better diets cost more than the poorer ones, but some households obtained an A grade diet on less than the mean expenditure for D grade, while others were still obtaining only D grade diets when spending more than the A grade mean (see Table VI).

These facts would indicate that although the amount expended on food is a factor, good management and a knowledge of basic nutritional principles also play their part.

TABLE V.

Frequency Table of Weekly Expenditure per Adult Male Unit in Each Area. Tasmania, 1945.

Class Interval Two Shillings.	Hobart.	Launceston.	Huon.	St. Marys.	Scottsdale.
S. s. d.					
6– 7 11½ ..	—	—	—	—	—
8– 9 11½ ..	1	1	1	1	—
10–11 11½ ..	5	4	5	1	1
12–13 11½ ..	7	1	4	4	5
14–15 11½ ..	9	6	4	—	1
16–17 11½ ..	4	6	6	3	4
18–19 11½ ..	6	7	7	3	4
20–21 11½ ..	8	6	5	1	1
22–23 11½ ..	1	6	3	1	1
24–25 11½ ..	1	2	1	2	2
26–27 11½ ..	1	1	1	—	—
28–29 11½ ..	—	1	—	—	1
30–31 11½ ..	1	—	—	—	—
32–33 11½ ..	—	—	—	—	—
34–35 11½ ..	—	—	—	1	—
36–37 11½ ..	—	—	—	1	—
38–39 11½ ..	—	—	—	1	—
40–41 11½ ..	—	—	—	—	—
42–43 11½ ..	—	—	—	—	—
44–45 11½ ..	—	—	—	—	—
46–47 11½ ..	—	1	—	—	—
48–49 11½ ..	—	—	—	—	—
Total	44	42	37	19	20
Mean	16·95	19·24	17·22	20·26	17·90
S.D. of mean ..	4·45	4·07	4·46	8·39	5·08
Percentage of A grade diets ..	13·6	19·0	24·3	63·1	45·0
Percentage of D grade diets ..	40·9	21·4	29·7	15·7	15·0

Milk Consumption: Calcium Intake.

The varying milk consumption in the different areas which so definitely affects the adequacy of the diet, is probably due to the same two factors.

St. Mary's and the Huon offer an interesting contrast, especially with reference to the difference in the percentage of households that own a cow. Here availability would possibly play a part, but the economic factor may be important. Also there is some ground for assuming that the householders have cows because they realize the importance of milk in the diet, and are able in this way to provide more milk than they could otherwise afford.

The milk consumption in the Tasmanian metropolitan areas is lower than that in metropolitan areas on the mainland of Australia. The reason may be a question of

supply, although milk is a commodity for which, in general, the supply meets the demand.

A comparison of the calcium intake of households in which there was a pregnant or lactating woman has been made with the calcium intake of all households surveyed. The mean percentage by which households in the former class failed to reach the recommended allowance was 41% in the metropolitan areas and 23% in the country centres, while the overall figures were 25% in the metropolitan areas and 18% in the country centres.

The 1944 results show similar differences. This would indicate that there is a lack of awareness that these vulnerable groups require more milk, or that money is not available to procure the extra quantity needed.

Fruit and Vegetable Consumption: Ascorbic Acid Intake.

Clements[2] has pointed out that in Tasmania, in contrast to the southern mainland cities, the trough in ascorbic acid supplies occurs in the spring. A comparison of the consumption of fruit and vegetables in Perth, Adelaide and Tasmania, as found in spring 1944, showed that in Tasmania there was a higher consumption of potatoes, an equal consumption of green and yellow vegetables, a much lower consumption of tomatoes and citrus fruit, and a lower consumption of fruit other than citrus.

TABLE VI.

Frequency Distribution Showing Weekly Expenditure per Adult Male in the Different Grades of Diet.
Tasmania, 1945.

Class Interval Two Shillings.	"A" Grade.	"B" Grade.	"C" Grade.	"D" Grade.
S. s. d.				
6– 7 11½ ..	—	—	—	—
8– 9 11½ ..	1	—	—	3
10–11 11½ ..	—	1	4	11
12–13 11½ ..	3	5	6	7
14–15 11½ ..	1	2	7	10
16–17 11½ ..	8	5	5	5
18–19 11½ ..	7	9	8	3
20–21 11½ ..	6	6	6	3
22–23 11½ ..	5	3	3	1
24–25 11½ ..	4	3	1	—
26–27 11½ ..	2	—	1	—
28–29 11½ ..	2	—	—	—
30–31 11½ ..	1	—	—	—
32–33 11½ ..	—	—	—	—
34–35 11½ ..	1	—	—	—
36–37 11½ ..	1	—	—	—
38–39 11½ ..	1	—	—	—
40–41 11½ ..	—	—	—	—
42–43 11½ ..	—	—	—	—
44–45 11½ ..	—	—	—	—
46–47 11½ ..	1	—	—	—
48–49 11½ ..	—	—	—	—
Total	44	34	41	43
Mean expenditure	22·14	18·59	17·34	14·35

Tasmania is dependent for its supplies of citrus fruits on imports from the mainland, and for this reason the amount available to the consumer is less and the cost more in Tasmania than in other States.[3]

This inequality of distribution is seen within the State itself. Twice the amount of citrus fruit and tomatoes per adult male was consumed in Launceston as compared with Hobart. This port is near the mainland and the imported food is apparently more readily available. Of the other areas surveyed, St. Mary's had the lowest *per capita* vitamin *C* intake, and it is the town farthest removed from the distributing centres.

The shortage of supply of concentrated sources of vitamin *C*, for example, tomatoes and citrus fruit, appears to be the main factor causing the intake of the nutrient to be less in Tasmania during the spring months than in other States at the same time, as the other sources of vitamin *C*, potatoes and green vegetables, are consumed in at least equivalent amounts.[3]

Validity of Survey Method.

This survey has demonstrated that the results obtained by the method of sampling and data collecting used in the 1944 survey, are reproducible and give a true picture of the mean food consumption and dietary pattern of the population under consideration.

The figures for the food consumption and nutrient intake levels and the percentage of households that failed to reach the recommended allowance of the various specific nutrients in a second random sample of the population of Tasmania, were each in close agreement with the figures obtained for the sample investigated in 1944.

Where there are significant differences in the results of the two years, an explanation was easily found. The chief difference was in the average consumption of dairy produce, especially milk, in the country areas surveyed. The inclusion of Queenstown in the 1944 survey and St. Mary's in the 1945, caused the difference. Queenstown is a mining town in a mining district, where the country is barren and mountainous, and the climatic conditions are most unsuitable for food production. A very small quantity of fresh milk is produced locally, but cows have to be hand fed during the whole year. St. Mary's, on the other hand, although a mining town, is in a dairy-farming district, and also a high percentage of the households have their own cows and poultry runs.

SUMMARY.

1. The 1945 survey showed that with few exceptions the food consumption and dietary levels in Tasmania were identical with those of 1944.

2. The dietary pattern in Tasmania showed a higher cereal-potato and a lower protection food consumption than in the mainland of Australia.

3. It is doubtful whether the intake levels of calcium and vitamin *C* in a percentage of the households surveyed are sufficient to ensure optimal health for all members of the households.

4. A number of the households investigated failed to reach the recommended allowance for Calories, and a large percentage of households fell short of the recommended allowance in intake of specific nutrients.

5. Of all areas surveyed Hobart showed the lowest intake level of Calories and specific nutrients (with the single exception of vitamin *C*), and highest percentage of low grade diets.

6. An attempt has been made to elucidate the causes of the different dietary pattern in Tasmania compared with the mainland States.

7. The value of this survey to validate the survey method used is discussed.

REFERENCES.

(1) "The Food Consumption and Dietary Levels in 2,730 Australian Family Households in 1944". National Health and Medical Research Council, Special Report Series, Number 1. Canberra, 1945.

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(3) V. Pecover, T. J. Norris, and F. W. Clements: "Nutrition Survey of Tasmania: II. Vitamin C. Nutritional Status in the Spring of 1945 and Autumn of 1946." (To be published.)

A NOTE ON THE DURHAM FERMENTATION TUBE.

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THE paradoxical results obtained in fermentation tubes when some organisms were grown therein led to the investigation of the sugar content of the medium within the Durham fermentation tube and of that in the larger test tube containing the Durham tube. The method of preparation of the fermentation tubes in this institute was studied and the sugar content of tubes prepared by alternative methods were determined.

At this institute it has been the practice to prepare fermentation tubes in two stages. Firstly, peptone water and Andrade's indicator were added to a test tube containing on inverted Durham tube, and this was then

autoclaved. In the second step a measured amount of the appropriate sugar solution, sterilized by filtration, was added to the peptone water and indicator. The tube was then ready for use. It relied upon diffusion of the sugar into the Durham tube from the medium outside it.

Experimental Investigation.

1. From a glucose peptone tube, prepared as described above, the medium was removed by a Pasteur pipette, the Durham tube being left still full. The glucose content of the medium within the Durham tube and of the medium outside the tube was estimated by means of the Hagedorn-Jensen method. The results were as follows: (i) the glucose content of the medium within the Durham tube was 0·23%; (ii) the glucose content of the medium outside the Durham tube was 2·5%.

2. Two tubes containing sterile peptone water with indicator and 0·23% glucose solution were inoculated, one with *Pseudomonas pyocyanea* and the other with a coliform bacillus. The tube containing the coliform organism gave an acid reaction after twenty-four hours' incubation, whereas that containing *Pseudomonas pyocyanea* had not shown an acid change after fifteen days' incubation.

3. Two lactose fermentation tubes were prepared, the first in the manner which has already been described, and the second by adding lactose solution to a tube containing peptone water and indicator but no Durham tube, then filling a sterile Durham tube with this medium and inverting it in the fermentation tube so that no air entered it. The two tubes were inoculated with a coliform bacillus and incubated at 37° C. The first tube showed earlier acidification of the medium outside the Durham tube, but after four days' incubation the amount of gas in the Durham tube formed merely a small bubble and the medium itself gave no acid reaction. In the second tube, at the end of four days' incubation, the bubble of gas was appreciably larger and the medium within the Durham tube gave an acid reaction.

4. A glucose peptone water solution was prepared and divided into three parts. The first was left unheated, the second was sterilized for one hour in steam, and the third was autoclaved for ten minutes at ten pounds' pressure. The glucose content of these three solutions was then estimated by the Hagedorn-Jensen method. The results were as follows: (i) unheated tube, 0·98% glucose; (ii) steam-sterilized tube, 1·03% glucose; (iii) autoclaved tube, 0·93% glucose.

5. A similar investigation of lactose peptone water gave the following results when the lactose was estimated by Cole's ferricyanide methylene blue method: (i) unheated tube, 0·92% lactose; (ii) steam-sterilized tube, 0·89% lactose; (iii) autoclaved tube, 0·88% lactose.

6. During routine laboratory investigations a Gram-negative bacillus was isolated, which, when grown in a lactose fermentation tube prepared in the usual manner, formed acid and gas within the Durham tube, but caused no change in the medium outside the tube. A lactose peptone water culture of a strain of *Pseudomonas pyocynea* formed acid within the Durham tube; but pigment formation was the only change noted in the medium outside the tube.

Comment.

These results show that simple diffusion cannot be relied upon to produce an equal concentration of sugar within and without the Durham tube when a solution of this sugar is added to the medium outside it. Further, the lower concentration of the sugar within the Durham tube may give rise to paradoxical results when the changes in this tube are compared with the changes in the medium outside the Durham tube. These results may depend upon the lowered gaseous tension within the Durham tube as well as upon the lower sugar content; but if there is to be agreement between the results of investigations on the Gram-negative bacilli in different laboratories, a standard method of preparation of the fermentation tube is essential.

The technique which has been described above is unsatisfactory. The autoclaving of a fully prepared tube has the possible objection of caramelization of the sugar in the medium, although when glucose and lactose were autoclaved for ten minutes at ten pounds' pressure no significant change was noted in the sugar content of the media.

Durham[1] suggested that the tubes should be fully prepared and then sterilized by discontinuous sterilization, which drives the air from the inverted tube. Steam sterilization still appears to be the ideal method, although in view of these results, the objection to autoclaving seems theoretical.

Reference.

[1] H. E. Durham: "Theoretical Considerations upon the Nature of Agglutinins Together with Further Observations upon Bacillus Typhi Abdominales and Bacillus Enteritides, Bacillus Coli Communis, Bacillus Lactis Aerogenes and Some Other Bacilli of Allied Character", *The Journal of Experimental Medicine*, Volume V, 1900-1901, page 353; "A Simple Method for Demonstrating the Production of Gas by Bacteria", *British Medical Journal*, Volume I, 1898, page 1387.

Reviews.

ANÆSTHESIA.

A COMPREHENSIVE work, "Anæsthetic Methods", by Geoffrey Kaye and his associates of the Alfred Hospital, Melbourne, is a remarkable achievement.[1] Not only does it represent a thorough and up-to-date review of current practice, including the striking developments of the past fifteen years, but it also contains many unique features. Notable among these are the numerous sectional diagrams of a great variety of apparatus, an aspect hitherto virtually neglected in textbooks of similar character. It is Dr. Kaye himself to whom we are indebted for this highly instructive novelty, which must greatly improve the knowledge and understanding of those concerned with anæsthetic machines and appliances.

The book exhibits throughout exceptional conciseness and lucidity, which more than compensate for the few noticeable omissions and the occasional examples of obscurity or bias. A rigid adherence to the obsolescent subjunctive grammatical form is, however, rather tedious and suggestive of pedantry. Despite a liking for such terms as "as follow", "irrecoverable", "respiratory exchange" *et cetera*, and a distressing predilection for the use in many places of "liable" instead of "apt", the writers maintain a generally impeccable style.

Evidence that great pains have been taken by both the authors and the publishers is indicated by the rarity of errors, typographical and otherwise. Indeed only sixteen frank mistakes were found in the whole book. Six of these seem to be printer's errors; the remaining ten errors seem to be attributable to the writers.

The subject matter is dealt with in a sound and progressive fashion. Methods, as the title of the work indicates, are described rather than technical details. Whether this arrangement would be sufficiently instructive for recent graduates is questionable, but more experienced students could not fail to benefit from it. The scope of the work is exhaustive, and only two omissions of major significance are apparent. A whole chapter might well have been devoted to the discussion and illustration of posturing during anæsthesia, which if unsuitable may have the gravest of consequences, as shown in Figure 27 on page 126. Again, "balanced" or "combined" anæsthesia, so common a practice today, possesses such advantages and pitfalls as to warrant its detailed examination.

The book opens with a useful introduction, followed by a brief historical review and a discussion of the probable mode of action of the general anæsthetic agents. The next three chapters constitute an excellent account of the physiological basis of anæsthesia. Herein much emphasis is placed upon the importance of an adequate oxygen supply during general anæsthesia. The use and abuse of carbon dioxide are also examined thoroughly, perhaps with a tendency to bias, in that undue emphasis is placed on its presumed deleterious properties. In the four following chapters the signs of anæsthesia, the care of the patient, the assessment of risk and the choice of anæsthetic are described in an admirably succinct fashion. The next two chapters cover premedication and basal narcosis; the presentation is good, if at times tempered with excessive caution. Here a strange omission occurs—there is no mention of the use of the barbiturates, given either rectally or intravenously, for basal narcosis.

[1] "Anæsthetic Methods", by Geoffrey Kaye, M.D. (Melbourne), D.A. (R.C.P. & S. England), in collaboration with Robert H. Orton, M.B., B.S. (Melbourne), and Douglas G. Renton, M.B., B.S. (Melbourne), D.A. (R.C.P. & S. England); 1946. Melbourne: Ramsay (Surgical) Proprietary Limited. 9" × 5½", pp. 718, with many illustrations. Price: 50s.

The volatile anæsthetics then receive detailed consideration, with numerous fine illustrations and graphic records. Ether enjoys its usual priority, followed by chloroform, ethyl chloride, vinyl ether and trichlorethylene. Analeptics, in comparison with oxygen, are properly relegated to a secondary place in resuscitation therapy, this notwithstanding the priority which certain stimulants must be given in spinal analgesia.

While it contains much that is admirable, the chapter on endotracheal anæsthesia exhibits a number of grave defects. At the outset, confusion, obscurity and inaccuracy are present in the comparison of the inhalational and insufflational methods. Subsequently the former is competently described, but the latter, held to be obsolete, receives inadequate attention. Admittedly it is obsolescent, but being still widely used, it deserves better elucidation, especially as to its principles. In addition, the proper adaptation of insufflational apparatus to inhalational appliances deserves more extensive discussion.

Gas anæsthesia is next described in a generally satisfactory manner, but too much emphasis is placed on the virtues of nitrous oxide and ethylene and too little on those of cyclopropane, the alleged dangers of which are unduly stressed. Here the authors depart from their original emphasis on the necessity for adequate oxygenation in that they condone, even in the presence of powerful adjuvants, the questionable practice of regulating the depth of anæsthesia by the manipulation of an already deficient oxygen supply. If anything is obsolete, it is this procedure. A good chapter on carbon dioxide absorption is interposed in this discussion of the gases, but here again the approach is defective in that its most difficult application—that is, in nitrous oxide and oxygen anæsthesia—is described first. It would have been better to give priority in this respect to cyclopropane or ether. Despite an anticipatory disclaimer, a substantial bias in favour of the clumsy "to-and-fro" method of absorption is evident, while the more convenient (and probably more common) "circle" method receives undeserved criticism. This series of chapters winds up with a good brief review of inhalational analgesia.

Emergencies and sequelæ of anæsthesia are then dealt with in successive chapters. The principles involved are outlined very well, but the presentation is somewhat laboured at times, and there is a recurrence of the earlier bias against the use of carbon dioxide as a stimulant.

Chapter XXVI deals with the intravenous use of the barbiturates for general anæsthesia. It is concise and informative, but there is undue scaremongering with insufficient elucidation of various details. The difficulties and dangers, while rightly emphasized, tend to be exaggerated. If the book is for beginners this attitude may be justifiable, but if the object is to instruct adequately, a more comprehensive discussion, with due attention to the scope and abuses of current practice, is essential. Assertions that the margin between respiratory arrest and cardiac failure is narrow and that the barbiturates are highly toxic drugs are not borne out clinically, at any rate in the experience of those competent in technique and informed regarding oxygen therapy. A revision of this chapter, designed to bring it into line with current opinion and practice, would be a great improvement.

Anæsthesia in dentistry and anæsthesia in midwifery are next dealt with in excellent style. As regards the former, much emphasis is placed on the use of nitrous oxide and oxygen, the description and illustrations being admirable. In the latter the ground is covered well, but, strangely enough, there is no mention of the use of pethidine in labour. Further, an assertion that spinal analgesia affecting more than the sacral area will decrease uterine tone and favour post-partum hæmorrhage is incorrect—the reverse is true. Indeed, if analgesia spreads above the sixth thoracic segment, tetanic spasm of the uterus is likely to occur.

The chapter on spinal analgesia is very good. Anatomical and technical considerations are fully described, and the various hazards of the method are examined in detail. The only defect is that practically no emphasis is placed on the importance of peripheral vascular paresis as the essential cause of circulatory depression. Its control by the use of ephedrine and "Neosynephrin" is inadequately discussed, a strange lapse indeed when an almost universal recognition of the value of these drugs is current. To rely on oxygen therapy and venoclysis as the most effective treatments for vascular hypotension is a sure invitation to disaster, which the timely and proper use of "Neosynephrin" would certainly avert. Oxygen therapy in the presence of a virtually stagnant circulation is valueless.

The book now draws to its close. Chapters on oxygen therapy, blood transfusion, fires and explosions, death under anæsthesia and records are generally admirable, containing a wealth of information. These are followed by an interesting discussion of the legal aspects of anæsthesia by Mr. David M. Selby. From this one concludes that the anæsthetist has a definite personal liability, unaffected by the surgeon's gratuitous assumption of full responsibility.

Three appendices, dealing respectively with recent innovations, equipment for private practice, and useful mathematical and physical data, are then included. A bibliography, a list of references and an excellent index end the book. It is a fine work, with evidence of much labour and care in its preparation. The paper is of good quality, the type is clear and the illustrations are exceptionally good. All concerned, authors and publishers, are to be congratulated on the excellence of their efforts.

ENCEPHALOGRAPHY.

"FURTHER STUDIES IN ENCEPHALOGRAPHY", by E. Graeme Robertson, is another contribution to our knowledge of this all-important method of neurological investigation.[1] The author has made an intensive study of this procedure and has acquired much valuable information. In this book he is mainly concerned with the mechanical factors which control the passage of gas from the spine to various parts of the ventricular system and subarachnoid space, and with the hydrodynamics of the cerebro-spinal fluid. Apparatus has been designed to reproduce as far as possible the conditions that exist in the human subject. From this and from X-ray pictures taken after the injection of gas in subjects with and without abnormalities of the central nervous system the author has drawn his conclusions. The book contains numerous diagrams and photographic reproductions illustrating in considerable detail the normal and abnormal variants. Several clinical cases have been recorded with reference to points under discussion. In these latter and in some other parts of the book the descriptions have been given in unnecessary detail; as a result reading is at times rather tedious. This minor criticism, however, does not detract from the intrinsic value of the contribution, which can be highly recommended to those who are interested in this subject.

PENICILLIN IN GENERAL PRACTICE.

A MONOGRAPH by Dr. J. L. Hamilton-Paterson,[2] pathologist to Redhill County Hospital, Edgeware, has been prepared specifically for the general practitioner; but in virtue of the clearly arranged wealth of information contained within its 95 pages it can be confidently recommended to all those who have occasion to use penicillin — from the hospital resident to the specialist.

The first twenty pages are devoted to a brief and concise review of the history, nature and properties of penicillin and the principles of treatment. These fundamentals are presented in a straightforward and readable manner, and include many observations not universally realized; for instance, that the development of a penicillin-resistant organism *in vivo* has not yet been satisfactorily demonstrated, and that where there is an apparent partial resistance it is readily overcome by increasing the dosage of penicillin.

The author considers that the danger of destruction of penicillin by heat has been exaggerated, and he enumerates five practical rules to be closely followed in the preparation and use of all forms of penicillin.

With regard to dosage, the danger of giving too little and the apparent impossibility of giving too much are stressed; the author urges that in the initial stages of a penicillin-sensitive disease massive doses should be given promptly, as these probably act in a bactericidal manner; also the use of larger quantities of penicillin gives much better results with both systemic and local methods of administration.

The book concludes with seven brief chapters, each devoted to the treatment of various diseases: infections of the lung, eye, ear, nose and throat and skin; to venereal diseases and to miscellaneous conditions which respond to penicillin therapy.

This book should find a favourable reception, not only because of its brevity, pocket size and moderate price, but because it is a publication to be kept at hand for quick and ready reference and will save many a time-consuming search through larger volumes.

[1] "Further Studies in Encephalography", by E. Graeme Robertson, M.D. (Melbourne), F.R.C.P., F.R.A.C.P.; 1946. Melbourne: Macmillan and Company, Limited. 10" × 7½", pp. 114, with many illustrations, some of which are in colour. Price: 45s.

[2] "Penicillin in General Practice", by J. L. Hamilton-Paterson, M.D.; 1946. New York, Toronto: Staples Press Limited; London: John Bale Medical Publications Limited. 6½" × 4", pp. 96, with illustrations. Price: 5s.

The Medical Journal of Australia

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INDUSTRIAL OR OCCUPATIONAL OPHTHALMOLOGY.

THE man who first said that nothing succeeds like success had probably been successful in one or more of his ventures, but not necessarily. He may have been nothing more than gifted with insight. Many people of today would probably have called him a psychologist. He knew that most men think more of schemes that reach their objective and of men who gain what they set out to get than they do of collective or personal plans that fail. He also knew that large numbers of people are ready to declare their faith, or to take part, in a movement that is successful. He was probably discerning enough to see that while the example of intelligent men who adopt a certain line of action may make those of their kind, who are few, give serious thought to the question at issue, others fall into line either because they do not wish to be out of the swim or because they are like sheep and follow where the crowd leads. A good deal of this is true of preventive medicine, particularly on the industrial side. It may be said in the terms of our aphorism that the success of industrial medicine depends largely on its success. Employers have to be made to realize that they owe it to their employees to take every possible step to safeguard their health and to promote their welfare, and that their business will prosper as everyone concerned in it is in possession of good health and of reasonable social security. Employees on their part must learn to value measures taken to secure their health in the knowledge that it is better to work in surroundings planned to keep them free from disease and injury than it is to take their chance in a haphazard environment. Medical practitioners, the third group of persons concerned in industrial medicine, are in no need of instruction about its value and of their contribution to it. Once employers, employees and the medical practitioners who serve them make a success of a venture in industrial hygiene further successes follow. Industrial hygiene, or the practice of industrial medicine, is making headway in industrial life, and it is probably not wishful thinking to suggest that progress is the result of intelligent understanding rather than of any sheep-like qualities among employers and employed. One branch which seems to lag behind is that concerned with the eyes and their use.

Nearly five years have passed since reference was made in these columns to industrial ophthalmology. On that occasion mention was made of the curious lack of interest on the part of both employers and employees in any suggestion that the eyesight of the rank and file in industry should be investigated and supervised. It was thought that apathy was due to many reasons and that among them were a refusal to face facts, laziness and a misguided spirit of independence. Our discussion in 1942 was based on a special article by A. C. Snell, A. Culler and Hedwig S. Kuhn that appeared in the industrial health number of *The Journal of the American Medical Association*. Another industrial health number of that journal bears the date November 30, 1946, and it includes an article on industrial ophthalmology by Hedwig S. Kuhn. Apparently in America interest in industrial ophthalmology is hard to arouse, and this is Kuhn's main reason for returning to the attack. Of her ardour there can be no doubt, for she states that by "spotlighting" the subject she hopes to make many ophthalmologists "catch fire and take hold". While not wishing to see Australian ophthalmologists consumed with zeal of such a high order as this, we should like to see them tackle the subject in earnest, and some of Kuhn's ideas may therefore be presented. Much of the ground is necessarily the same as that covered five years ago, but the paper is none the less important for that. In the first place Kuhn states that the term industrial ophthalmology is obsolete and that the term occupational ophthalmology is more suitable. If the latter term is to be used to include persons engaged in any kind of occupation, medical workers will readily agree. There seems to be no reason why persons engaged in one kind of occupation should be given the benefit of a preventive and curative eye service and others who earn their living in a different kind of way should be excluded. Kuhn makes no suggestion in this regard, but she enumerates phases of work that come within the scope of occupational ophthalmology. They may be shortly described as follows: (i) The use of new visual sight-testing techniques to provide accurate information so that capacities of the eye may be matched to demands of the job. (ii) The use of corrective procedures based on a knowledge of actual work distances and the mechanical details of the demands of a job. (iii) The development of a new fact-finding approach in the handling of properly recorded visual statistics. (iv) The development of closer relationship between managements and the medical profession. (v) The bridging of the gap between the work of safety engineers and that of professional ophthalmic services by an interest in safety devices and an understanding of protective equipment. (vi) An understanding of illumination in industry and the use of colour in the reduction of visual fatigue. (vii) An understanding of what constitutes a minimum industrial eye service for a given industrial plant. (viii) The incorporation of courses in medical schools for both undergraduates and graduates. (ix) The number of ophthalmologists to undertake the work and their willingness to cooperate. (x) The determination of subjects for research. In regard to these some explanation may be made. In the

first place it has been said that the examination of a worker prior to his employment is a means of refusing him employment. As a matter of fact it is a means of making sure that he is employed in the way best suited to his visual apparatus. The data that should be secured and recorded for each employee include the acuity of vision for distance with and without correction, acuity of near vision with and without correction, the phorias for distance and near vision, stereopsis for distance and near vision and colour appreciation. Any correction that can be provided for defects should be undertaken. In some types of work acuity of vision may not be particularly desirable, but it is curious how some men will try to carry on with an obvious handicap, even though the defect interferes with their efficiency. Kuhn makes an important point when she states that the best refractive skill is required to provide proper correction in most occupations, and she holds that this skill can be "tragically ineffective" unless actual work operations and distances have been witnessed by the refractionist. This is of course only an example of the general principle that an industrial medical officer is not in a position to do effective work unless he understands the industrial process with which his examinees have to deal. Again, Kuhn points out that while most refractive errors can be corrected, a lack of colour sense and complete lack of stereopsis cannot be corrected. Some phorias are amenable to orthoptic treatment. Nothing, she thinks, is more destructive of confidence than (*a*) to send workers lacking stereopsis or colour vision, or having minor muscle imbalance, for correction only to have them told that there is nothing the matter with them, or (*b*) to send out persons with exophoria or persons whom orthoptics could help when orthoptic training facilities do not exist. This may be summed up by the statement, as already suggested, that none but those thoroughly trained in ophthalmology who have also gained insight into the industrial process should undertake this work. We need not discuss such questions as the minimum eye service required in an industrial plant, nor is it necessary at the moment to debate the extent to which industrial, or occupational, ophthalmology should be brought to the notice of the medical student. What is needed in this country is the creation of interest in the subject. Five years ago we suggested that it was a subject which the Ophthalmological Society of Australia (British Medical Association) might adopt as the central theme for one of its annual meetings, but the war curtailed the activities of the Society, as it did those of other scientific bodies. Whether the society adopts our previous suggestion or not, it would be useful if its members were asked to report on the extent to which industrial ophthalmology is practised in the several States. The society has shown interest in the industrial side of ophthalmology by inviting to its meetings, and hearing papers from, lighting engineers on illumination in industry. By maintaining and extending its interest it can do a service to medicine and to the whole community. The society is an integral part of the British Medical Association, and the members of the association are so closely bound together in their thought and work that the activities of the society must have an effect on all the members of the association. Thus the Ophthalmological Society can help to start success in industrial ophthalmology on its successful career.

Current Comment.

PROBLEMS OF YOUNG DIABETICS.

A FEW years ago some comment was made in these pages on the psychological aspects of diabetes in children. These have been studied by a number of observers, particularly in connexion with such organizations as summer schools and special clinics for diabetics. Further observations have been made since then, and these are of great interest because the general picture has changed with regard to diabetes. When insulin was first introduced we had to readjust ourselves from the attitude of the pre-insulin days, which concerned patients of mature age in the main, living under conditions of considerable restriction. With the general adoption of crystalline insulin we entered the era dominated by multiple injections and a diet carefully adjusted to meet the needs of a rapidly fluctuating blood-sugar content. It was the age of the scales. Now we have passed into a more liberal phase, thanks to the introduction of the slowly absorbed insulins. How have these later methods affected the young people who have to live and grow up with their aid? It is not only to their physical capacity to take their part in the world that we must look, but also to their psychological background. This important question is dealt with by Alfred E. Fischer and Henry Dolger in a recent paper.[1]

These authors point out that some of the studies on the subject have been based on observations made over a restricted period. To overcome this fallacy they have followed patients and their records over ten or twenty years. For this space of time the patients have been under treatment, and have been growing up under environments of all kinds, poor and well-to-do, easy going and over careful, intelligent and unintelligent. All these patients were twelve years of age or younger at the outset of the disease; twenty were watched for ten years, and twenty-three for fifteen to twenty years. Many of them were of Russian-Jewish origin. Most of the children came from poor families in the economic sense. Few children realize the implications of a diagnosis of diabetes or of its possible complications, but their parents do, if they are intelligent. It is evident that the parent-child relationship, always difficult in a world whose rapid changes tend to sunder one generation from another in thought, is in danger of becoming more unstable once this diagnosis is made. Some of the parents in this series became absurdly fearful, refusing to allow the child any responsibility, and constantly surrounding him with an atmosphere of anxiety. For example, it is not a good thing for a child to be awakened each night by a worried parent whose dread is that sleep might be masking an insulin coma. Yet under treatment with the modern insulins we know that patients often pass through a stealthy hypoglycæmic state during the night hours. There is actually a certain danger that the child may grow up with the drawback of its nervous system undergoing regular and rhythmic sugar shortage. That this does occasionally occur the authors believe, and give instances of young people who have suffered some demonstrable deterioration of intellectual power, thought to be related to the cumulative effects of hypoinsulinism. This is, of course, a risk which should be removed by accurate planning of a correct *régime*, and it does not in the least excuse, though it may explain, the disastrous results to a child's personality if he is over-coddled and made fearful instead of self-reliant. Physicians interested in diabetes will be alive to the real difficulties introduced by the slow depression of the glucose content of the blood by insulin of the protamine or similar type. It was found by Fischer and Dolger that girls were more socially conscious of their malady than boys, some of them acutely so. One minor but quite important point was the distress caused by the peculiar alterations in the contours of the arms and legs due to repeated injections of insulin. The onset of puberty seemed to cause some improvement

[1] *Archives of Internal Medicine*, December, 1946.

in this condition, but some children were so sensitive that they would not wear ordinary bathing costumes on this account. Altered behaviour was noted in a number of the young patients. Some of these manifestations were not due to particular features of the environment, though an attempt to escape from regimentation was responsible in others. In general, however, the authors lay stress on the transience of most of the psychopathic phenomena observed during adolescence. The chief factors were apparently the physical complications of diabetes, imperfect social adjustment, and a general feeling of inferiority. Intelligence tests were carried out, and no special difference was noticed in these children, as might perhaps be expected, in spite of conflicting reports in the literature. An attempt was made to assess the adjustment of each patient to his disease, his family and to society.

If any generalization is made from the figures presented in this article, it is that the success of the diabetic adolescent in overcoming his difficulties in meeting the world depends to a great extent upon his environment. This might be expected, but the moral is that the parents of diabetic children can do much for these less fortunate ones. Marriage has presented a problem to some of the patients in this series, which a number of them have solved successfully. Very few children have been born of the marriages of these patients, but there must be several possible reasons for this; therefore no figures of value can be given.

The authors remark in conclusion that the effect of a disease that is not merely chronic but lifelong and present with the patient every day, is as important on the psyche as it is on the body. Treatment of the condition must not hedge round the patient with unnecessary restrictions, for it must be realized that diabetes does produce psychological problems, and these may be associated with abnormal behaviour in children, adolescents and adults.

CHEMOTHERAPY.

A TIMELY reminder that the term chemotherapy is not applicable only to the use of such preparations as the sulphonamides and penicillin has been given by Sir Alexander Fleming in the Linacre Lecture of 1946, recently published in pamphlet form by the Cambridge University Press.[1] This view is easily acquired because of the revolutionary changes that have been brought about by the introduction of the sulphonamides and penicillin and because of the prominence that has been given to them in medical and other scientific journals of all countries. Fleming deals with chemotherapy in its earliest forms; he describes the development of present-day chemotherapy and has pertinent observations to make about the future. His lecture therefore is one that should be studied by all practitioners of medicine; they need a balanced judgement if they are to use chemotherapeutic drugs to the best advantage, and this cannot be obtained without an understanding of the subject as a whole.

Fleming does not deal with the whole field of chemotherapy, but with such aspects of chemotherapy of bacterial infections of which he has first-hand knowledge. He shows first of all that to use the word chemotherapy as having reference to those methods in which the chemical is administered in such a way that it gets into the blood and attacks the infecting microbes through the circulation in concentrations sufficient to destroy them or modify their growth, is too narrow a definition. He uses the term to cover any treatment in which a chemical is administered in a manner directly injurious to microbes infecting the body. In this sense antiseptic treatment is chemotherapy—local chemotherapy. If a chemical is to be effective in the treatment of established infection it is necessary that, in addition to killing or inhibiting the growth of the microbes on the surface, it should be able to diffuse into the tissues to reach the microbes there. In the prophylactic chemotherapy following on Lister's work none of the chemicals had much effect in destroying bacteria once they had invaded the tissues. In the war of 1914-1918 many different chemicals were poured into wounds in an attempt to destroy the infecting microbes. Fleming refers to an observation of his in connexion with Carrel-Dakin treatment. He had an opportunity of studying the length of time that Dakin's fluid remained active in a wound. The custom was to introduce the fluid into a wound every two hours. Fleming found that when Dakin's fluid was left in a wound for ten minutes its potency had diminished below the limit at which it was antiseptic in serum. This meant that for one hour and fifty minutes there was no effective chemical in the wound. But Dakin's fluid had another unexpected action in which Fleming suggests that its virtues lay—it caused an increase in the transudation of fluid from the walls of the wound which persisted for some time after the fluid was removed. *In vitro* Dakin's fluid was a powerful antibacterial agent in the absence of serum or pus. Fleming holds that it is desirable to see how long these chemicals remain active in the body, and that before they are classed as chemotherapeutic agents, it should be determined whether their apparently beneficial effect is due to a direct antibacterial action. Fleming describes the testing of the effect of a chemical on bacteria by the estimation of its power to inhibit growth and on leucocytes by its power to inhibit phagocytosis. He shows that, owing to a difference in the time taken for these two actions, a false idea of the destructive action of a chemical on the leucocyte may be obtained. With chemical antiseptics there is a range of concentrations at which the chemical destroys the leucocytes without interfering with the growth of the bacteria—the natural antibacterial power of the blood is removed. When mercuric chloride is tested with *Streptococcus pyogenes*, a 1 in 20,000 solution destroys leucocytic action and allows the streptococci to grow; weaker solutions completely stop growth of the streptococci, but only if leucocytes are present.

Turning to chemotherapy of today, Fleming traces shortly the history of the sulphonamides. Here was something which did control many common bacterial infections. Their action, however, was found to be inhibited by certain substances. It was found quite early that, *in vitro*, complete bacteriostasis was obtained with a small inoculum, but with a large inoculum the microbes grew freely. Fleming describes experiments showing that streptococci may produce something which does not destroy sulphanilamide, but merely inhibits its action. He also refers to the discovery that as a result of widespread treatment sensitive strains of organisms may be displaced by insensitive strains. This has been specially noticeable in gonococcal infections and could be due to one of two things. The sensitive organisms may be eliminated by treatment with the drug, while the insensitive ones persist and are passed on from one individual to another; or by insufficient treatment with a drug a sensitive microbe may acquire resistance or "fastness" to a drug. There is, Fleming holds, probably no chemotherapeutic drug to which in suitable circumstances bacteria cannot react by in some way acquiring fastness. Then Fleming refers to penicillin, "the most powerful chemotherapeutic drug yet introduced". From his discussion on this drug only one remark need be recorded—it is the administration of too small doses which leads to the production of resistant strains of bacteria and there is no medical reason for underdosage. Gramicidin and tyrothricin and also streptomycin receive brief mention. In regard to streptomycin it is stated that bacilli appear to acquire a fastness to it much more rapidly than they do to penicillin or even the sulphonamides.

Under the heading "To-morrow" Fleming predicts that in the next few years a combination of antibiotics with different antibacterial spectra will furnish a "*cribrum therapeuticum*" from which fewer and fewer infecting bacteria will escape. He concludes with an urgent plea for the establishment in Britain of a central institute for fundamental research in microbiology. His arguments for this need not be repeated, but attention must be called to his view that had such an institute been in existence penicillin would have been developed in Britain long ago.

[1] "Chemotherapy Yesterday, To-day and To-morrow", by Sir Alexander Fleming, M.B., F.R.C.S., F.R.C.P., F.R.S., The Linacre Lecture, delivered at Cambridge on May 6, 1946; 1946. Cambridge: The University Press. 7½" × 5", pp. 39. Price: 2s.

Abstracts from Medical Literature.

THERAPEUTICS.

Streptomycin in Tularæmia.

C. HOWE, L. CORIELL, H. BOOKWALTER AND H. ELLINGSON (*The Journal of the American Medical Association*, September 28, 1946) describe the treatment of four patients with tularæmia by injections of streptomycin. The dry material was dissolved in a 2% solution of procaine. One to three millilitres and thirty to one hundred thousand units were injected intravenously or subcutaneously every three hours. Two patients had tularæmic pneumonia, one had typhoid tularæmia, and one ulceroglandular tularæmia; 5,800,000 units were given. The results were good in two cases, equivocal in one, and complicated by reaction to the drug in the shape of high fever and pruritic erythematous rash. The toxic effects were transitory and the patient recovered. Three patients were treated with streptomycin during convalescence without response.

Penicillin Spray.

F. W. MORSE (*The Journal of the American Medical Association*, October 5, 1946) describes the use of a penicillin spray produced by a hand-operated bulb atomizer in the treatment of respiratory infections by inhalation. The patient inhales and holds his breath at the end of inspiration. It has been claimed that 60% of inhaled penicillin has been recovered from the urine in twelve hours, and that effective blood levels of penicillin were obtained by inhaling 20,000 units every two hours in a spray. Boiled and cooled water was used as the solvent of penicillin. One hundred thousand units were dissolved in ten millilitres of sterile tap water. The atomizers used were "De Vilbiss" number 15, "Atlas" number 82 and "Glaseptic". All were effective, but the "Atlas", having a coarser spray, was easier for the patient to manipulate. The dosage used was 40,000 to 100,000 units in twenty-four hours, given by four-hourly inhalation. Bronchiectasis, pneumonia, sinusitis, laryngitis and influenza were all treated effectively.

Male Sex Hormone.

W. O. THOMPSON (*The Journal of the American Medical Association*, September 28, 1946) discusses the uses and abuses of the male sex hormone. Testosterone propionate is a potent therapeutic agent which is indicated in hypogonadism mainly. In eunuchoidism where the testes are destroyed by injury symptoms may develop such as lack of energy, nervousness, loss of erections and hot flushes. In such cases 25 milligrammes of testosterone given intramuscularly three times a week will afford relief. In such a case treatment must be continued indefinitely. In primary eunuchoidism associated with bilateral intraabdominal cryptorchidism, alteration or lack of development of the sex characteristics, lack of development of bodily hair, and absence of spermatogenesis may occur. Five hundred to one thousand international units of chorionic gonadotropin given intramuscularly three times a week may stimulate the testes; if not male sex hormone may be effective, inducing the appearance of male sex characteristics, increased appetite, weight and vigour, and of less feminine characteristics. In Frölich's syndrome with undescended testes, stimulating therapy with gonadotropin is indicated, rather than the use of male sex hormone, which inhibits the normal testis. Pituitary dwarfs with undescended testes may benefit in growth by the use of gonadotropin and male sex hormone at about the twelfth year. A male climacteric is spoken of, with lack of energy, hot flushes and symptoms like those of the menopause; when correctly diagnosed it is said to respond to treatment with testosterone given intramuscularly. This substance may also be administered by mouth, thirty to sixty milligrammes daily, or by implantation of pellets. The male sex hormone is sometimes of value in impotence from glandular causes, in Cushing's syndrome and in Addison's disease. Its value is doubtful in *angina pectoris*, in menstrual disorders, and in carcinoma of ovaries and breasts. It is harmful in that it may produce injury to the normal testis, heart failure in old men, œdema of the legs, acne, hypermetabolism and hypertrichosis.

Nitrogen Mustard Therapy.

L. JACOBSEN *et alii* (*The Journal of the American Medical Association*, October 5, 1946) describe the therapeutic effects of nitrogen mustards on neoplastic diseases and allied disorders. Methyl-bis (β chloroethyl) amine hydrochloride was injected daily for one to six days in doses of 0·1 milligramme per kilogram of body weight. The amine was dissolved in sterile normal saline solution. Patients suffering from Hodgkin's disease, lymphosarcoma, lymphatic and myeloid leuchæmia, sympathetoblastoma, multiple myeloma and *polycythæmia rubra* were treated. The only apparent benefit occurred in Hodgkin's disease, though remissions of some months were observed in some of the other diseases. Toxic effects included nausea and vomiting, diarrhœa, thromboses, and destruction of lymphatic tissue resulting in lymphocytopenia. In Hodgkin's disease, fever, lymphadenopathy, splenomegaly and hepatomegaly were all relieved in a few days, and repetition of the course produced further remissions.

Streptomycin.

D. R. NICHOLLS AND W. E. HERRELL (*The Journal of the American Medical Association*, September 28, 1946) discuss the uses and limitations of streptomycin. One hundred to two hundred milligrammes (100,000 to 200,000 units) are injected intramuscularly every three, four or six hours. The total daily dose is dissolved in one or two litres of isotonic sodium chloride solution. In bacteriæmia due to *Bacillus coli* and brucella the results are fairly good. The authors found that four out of five patients suffering from the former and three out of five suffering from the latter were cured. Urinary infections generally responded badly; the best results were obtained in *Proteus ammoniæ* and *Aerobacter aerogenes* infections. Influenzal meningitis (type B) infections showed good results, four patients recovering after combined intramuscular and intrathecal injections; 100,000 units in five or ten millilitres of saline solution were injected intrathecally every twenty-four or forty-eight hours, after withdrawal of a similar quantity of spinal fluid. Bronchial infections due to Gram-negative organisms responded fairly well to insufflation of nebulized streptomycin, 50,000 units per millilitre of isotonic saline solution, but organisms sensitive to penicillin tended to thrive, and streptomycin and penicillin were frequently employed together in these cases. In tuberculosis the results were doubtful. In syphilis streptomycin was ineffective. Typhoid and paratyphoid fever, undulant fever, osteomyelitis, cellulitis, peritonitis and cholangitis did not respond well. Toxic signs were nausea, fever, arthralgia, local reactions, renal irritation and skin rashes. Urticaria, pruritus and general dermatitis were sometimes troublesome. The usual daily dose of streptomycin was two to three million units (two to three grammes), but four million units had been given daily for long periods without ill effect as a rule. Serious damage to the eighth nerve has, however, been noted, and organisms at times developed resistance to streptomycin with incredible rapidity and with important bearing on the clinical results.

NEUROLOGY AND PSYCHIATRY.

The Psychopathic Personality.

KEITH D. HEUSER (*The American Journal of Psychiatry*, July, 1946) has worked out the Rorschach patterns of 28 soldiers, endeavouring to correlate clinical and Rorschach findings. His intention was to find constant Rorschach factors relating to personality elements in clinical behaviour. Several clinical histories are related, and the Rorschach technique is outlined. Criminals, sexual psychopaths and paranoid personalities are subtracted from the total. The author's conclusions are that the psychopathic personality appears shallow and flat, and lacking inner and outer control to result in normal behaviour. Though by psychometric examination the psychopath's intelligence is normal, there is lack of adequate intellectual depth to his personality. Basic instinctual drivers seem to dominate the cognitive subdivision of the psychopath's personality to the detriment of rational behaviour. There is apparently no outer-personal conflict. Emotional vacancy is more marked than in normal patients. A social misfit, the psychopath seems to be totally unmodifiable.

Criteria for the Stages of "Pentothal" Anæsthesia.

H. E. HIMWICH AND B. ETSTEN (*The Journal of Nervous and Mental Disease*, October, 1946) claim that though the intravenous administration of "Pentothal Sodium" is extensively used in narcoanalysis and narcosynthesis, there has been no report of a systematic study of the clinical signs. They group the clinical signs in four states according to the depth of the anæsthesia. The first of the states is clouded consciousness, with early euphoria. The patient can still answer questions, but physical execution reveals depression of cortical control. This phase is effective for narcoanalysis and narcosynthesis. The second state is hypersensitivity which begins with loss of consciousness. The patient is no longer aware of his environment, but is hypersensitive to pain. The corneal reflex is usually retained. The third state comprises: (*a*) light surgical anæsthesia; (*b*) moderate surgical anæsthesia with the

loss of all skeletal muscular movement in response to pain, the pupils being constricted and no longer reacting to light; (c) deep surgical anæsthesia with loss of corneal reflex, shallow and rapid breathing. The fourth state includes impending failure with extreme depression of respiration and diminution of the pulse pressure. This must be regarded as a warning sign of medullary failure.

Physical Signs of Schizophrenia.

IN discussing the well-recognized physical signs in schizophrenia, Theophil Klingmann (*The American Journal of Psychiatry*, July, 1946) draws attention to spasm of the radial arteries as a sign of importance which hitherto apparently has found no place in the literature. He considers it very common in cases of catatonic schizophrenia; it is also seen in anxiety states of the schizoid type. It is rare in the other varieties of schizophrenia. It resembles Raynaud's disease as it is apparently due to hyperstimulation of the sympathetic ganglia which send vasomotor fibres to the region. Two case histories are presented in which this typical radial artery spasm was displayed. The spasm disappears as the patient's mental state improves. This leads the author to speculate on the possibility of a similar vasospasm in the brain which might cause the organic changes resulting in schizophrenia.

The Legal Aspects of Psychiatry.

CRIME, according to W. Norwood East (*The Journal of Mental Science*, October, 1946), is not a disease. It is sometimes attributable to mental disease and mental defect. In the present state of knowledge character anomalies and mental diseases cannot be assumed to be identical. Crime, in the sense that it represents abnormal behaviour, is more quantitatively than qualitatively different from so-called normal behaviour. Punishment is deterrent, retributive and reformative, and is society's instrument of protection. The psychiatrist is not concerned with the punishment of the mentally normal criminal, but in the treatment of insane or defective criminals. To promote any form of treatment during a prison sentence is difficult. The sentence may be too short or too long; and some offenders may be best treated without a prison sentence which is not always compatible with the awards of justice. Further legal provisions are required to assist the psychiatrist in carrying on his social obligations both to the public and to the offenders.

Report on One Hundred Female Patients Treated by Pre-Frontal Leucotomy.

C. S. PARKER (*The Journal of Mental Science*, October, 1946) gives the results of the treatment of one hundred female psychotic patients by pre-frontal leucotomy, and tries to discover how far the operation may have made the patients useful members of society; he prints a number of letters from the relatives of discharged patients who had been deemed cured. This investigation shows that the operation is very useful in true melancholia whose symptoms can be relieved in a high percentage of cases. It applies to old-standing cases of melancholia which other methods of treatment have failed to modify. The author doubts whether leucotomy is any more efficacious in schizophrenia, paranoia and paraphrenia than are other methods of treatment. He finds that the personality changes after operation are less gross than might be imagined. In some cases the personality appears to be improved.

The Influence of Emotion on the Human Electroencephalogram.

ROBERT COHN (*The Journal of Nervous and Mental Disease*, October, 1946) claims that hyperemotional states give rise to two characteristic types of electroencephalographic pattern. The first type is characterized by a "spontaneous" low voltage random high frequency pattern; and when the patient's attention is shifted from the test and his environment a normal brain wave is registered. The second type is characterized by rhythmic activity predominantly in the frontal and parietal regions. This pattern is stable and uninfluenced by afferent stimuli of ordinary intensity. The author believes that rhythmic high frequency potentials observed in hyperaffective disorders are a product primarily of frontal lobe activity. The superimposition of somatic complaints on a basic emotional disorder causes increased frontal lobe activity from which an enhanced frontal electric potential output results. The recognition of these encephalographic patterns is considered important from neuropsychiatric considerations.

The Treatment of Psychiatric Disorders due to Combat.

HARRY A. TEITELBAUM *et alii* (*The Journal of Nervous and Mental Disease*, August, 1946) found that sub-shock doses of insulin offered no significant advantages over "Sodium Amytal", a *placebo* or group therapy in psychiatric disorders due to combat. Patients receiving sub-shock doses of insulin gained weight, but no correlation could be established between the gaining of weight and the improvement in psychiatric health. No correlation was discovered between the severity of the illness and the percentage improvement following treatment. Of the 201 patients studied, 69·1% were reclassified for non-combat duty, 16·9% were returned to their own outfits, and 14% were recommended for evacuation to the United States. Since the results of general group therapy, those of sub-shock insulin and those of two control groups compared so favourably, it seemed to the authors that the accelerated improvements following treatment were not due to any special therapeutic procedure.

GYNÆCOLOGY.

The Management of Fundal Carcinoma.

L. C. SCHEFFEY, W. J. THUDIUM, D. M. FARELL AND G. A. HAHN (*American Journal of Obstetrics and Gynecology*, October, 1946) discuss the value of irradiation therapy as an adjunct to surgery in the treatment of fundal carcinoma and are strong advocates of irradiation therapy in conjunction with surgery as a planned procedure. Among a series of patients treated prior to 1930 with adequate surgery alone there was a five-year survival rate of 62·5%. Four patients treated by inadequate surgery alone all died before five years, and 24 patients treated by radium alone had a five-year survival rate of 45·8%. Thirty patients with more advanced disease treated by radium and X rays had a five-year survival rate of 36·6%. Adequate surgery with preliminary radium treatment according to a planned technique has a five-year survival rate of 90%. The authors now follow a standardized procedure in all cases of suspected endometrial carcinoma. Following diagnostic curettage a dose of 4,500 to 5,000 milligramme-hours of radium is given and complete surgical operation is carried out six to eight weeks later. X-ray treatment is not given as a routine post-operative measure, but if there is visual or palpable evidence of carcinomatous extension or if recurrence is noted X-ray treatment is given. The authors are of the opinion that the preoperative use of radium causes local cancer destruction and may devitalize the growth even at some distance from the radium without altering its microscopic appearance. A general improvement is noticed in some patients between the time of radium application and the time of operation.

Total Abdominal Hysterectomy.

W. C. DANFORTH (*American Journal of Obstetrics and Gynecology*, August, 1946) discusses total abdominal hysterectomy and gives the technique and results of 500 operations. During the period covered by this report (1939-1945) 316 subtotal hysterectomies and 353 vaginal hysterectomies were done. The removal of the cervix by either the abdominal or the vaginal route has definite advantages provided it can be accomplished without an increased operative mortality rate. Without a thorough familiarity with pelvic anatomy and technique there is definitely greater danger in the total operation. There is an incidence of 2% of cancer in the residual cervix after subtotal hysterectomy. Chronic inflammatory conditions of the cervix are often more troublesome after subtotal hysterectomy on account of the poor blood supply and lowered resistance of the cervical stump. In the series of 500 operations there were two deaths (mortality rate 0·4%). One death was due to septicæmia and the other to uræmia. Cystoscopy and catheterization of the ureters proved the absence of ureteral obstruction in the latter case. Thrombophlebitis occurred in three patients; the ureter was injured in two patients and the bladder was opened four times. Conservative treatment is adopted towards the adnexa when possible and the appendix is not removed as a routine measure. When there is associated genital prolapse the author prefers vaginal hysterectomy unless a valid contraindication is present. Concerning technique, the vagina is opened and divided close to the cervix to avoid shortening of the vaginal canal. The base of the broad ligament is attached to the vaginal angle by a single suture on each side and the vagina is closed with a running suture of number 1 chromicized gut. When peritonealization of the pelvic floor is difficult on account of extensive inflammatory disease the sigmoid is attached to the raw area by a few interrupted sutures. The ovaries should be left freely mobile and not attached to the vaginal vault in view of the risk of interference with their blood supply and the later development of dyspareunia.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on October 24, 1946, at Saint Vincent's Hospital, Sydney. The meeting took the form of a series of clinical demonstrations by members of the honorary staff of the hospital.

Carcinoma of the Sigmoid Colon Removed Four Years after Diagnosis.

DR. V. J. KINSELLA showed an unmarried female patient, aged sixty-three years, who had been advised to undergo an operation in January, 1942. X-ray examination on January 26, 1942, had revealed an irregular constriction at the pelvi-rectal junction, with delay in the passage of the enema; the appearance suggested a neoplasm. The patient refused operation, but returned four years later, walking with difficulty on account of weakness. She had lost two stone in weight. A blood count showed that the erythrocytes numbered 2,700,000 per cubic millimetre and that the hæmoglobin value was 47%. A large mass was palpable in the left iliac region and in the pelvis.

The patient was given blood transfusions, and on December 18, 1945, a defunctioning colostomy was performed in the transverse colon. On January 22, 1946, the growth was removed, with the pelvi-rectal segment of the colon, part of the uterus and a segment of ileum. By mobilization of the rectum, in the manner described by Devine, it was possible to divide the bowel in the upper part of the rectum well below the growth, thus achieving an end-to-end anastomosis. But the division was too deep in the pelvis for the application of a bowel clamp. It was hoped that the defunctioning colostomy would have made the bowel clean. To everyone's surprise liquid fæces flowed out when the rectum was divided. Subsequent examination of the specimen revealed that the growth had fungated into the attached coil of ileum, so that ileal contents were able to enter the sigmoid colon. Convalescence was smooth, and later the colostomy was closed. The patient was shown at the meeting, her weight and strength having been regained and her colour being good.

Sympathectomy and Tonsillectomy for Hypertension.

Dr. Kinsella next showed a male patient, aged forty-five years, who had given up his work in the police force on account of headaches and giddiness due to hypertension. The symptoms persisted in spite of complete bed rest and medical treatment. Bilateral thoraco-lumbar sympathectomy was performed in two stages, on August 14 and 20, 1946; the symptoms disappeared and the blood pressure fell. Tonsillectomy was performed on September 24. Dr. Kinsella briefly discussed the indications for operation and the prospects in these cases.

Hydatid Cysts in the Lungs.

The third patient, whose condition was discussed by Dr. Kinsella, was a female, aged fifteen years, who had a huge hydatid cyst filling most of the right lung field, and three or four smaller cysts in the left lung. The large cyst was removed by the two-stage method, and skiagrams showed the progressive reexpansion of the lung over the five weeks prior to the meeting. Dr. Kinsella discussed plans for treatment of the multiple smaller cysts. He said that the patient was not shown at the meeting because a few days earlier she had felt pain in the left side of the chest and fever and cough had developed; she had coughed up one of the small cysts. The pain and fever had not yet subsided. The Casoni test in this case had produced no reaction. In such cases it was advisable to test the test fluid upon a patient who had, or had had, a hydatid cyst. The fluid might lose its antigenic power as it aged. Some workers considered that fluid taken from cysts which had no scolices or hooklets was always lacking in antigens.

Tuberculosis in Lungs, Colon and Mesenteric Glands.

Dr. Kinsella finally discussed the case of an unmarried female patient, aged twenty years, who had been admitted to hospital from a sanatorium on account of a large mass in the right side of the abdomen, thought to be a renal tumour. She had active tuberculosis in the left lung, and had an hæmoptysis while under investigation by the urologist. The mass was found not to be of renal origin. Examination after a barium enema revealed a large filling defect in the ascending and transverse colon. A diagnosis of intestinal tuberculosis was made. During the eight weeks of her investigation the patient was continuously feverish, her temperature reaching 100° or 101° F. each evening. In view of the active pulmonary tuberculosis it was difficult to decide whether laparotomy was justifiable. A decision to operate was finally made because of the pronounced and constant tenderness of the abdominal tumour. On July 9, 1946, the mass was removed with the terminal loop of the ileum, the right half of the colon and the ileo-colic and right colic arteries with their greatly enlarged tuberculous lymph glands. An end-to-end anastomosis of the ileum to the left part of the transverse colon was made. The patient's convalescence was uneventful. Her temperature rose the day after operation, but remained normal from then onwards, and her health improved very much. She had returned to the sanatorium, so that only her temperature charts and films and the pathological specimen could be shown at the meeting.

Subacute Bacterial Endocarditis.

In the absence of DR. R. J. TAYLOR, DR. W. BURKE showed a male patient, an unmarried station hand, aged twenty-nine years, who had been admitted to hospital on August 31, 1946. The history of his illness, given by his local doctor, was as follows. The patient had first been examined on August 24, 1946, when he had a temperature of 100° F. and small "sores" on his hands and feet. He was admitted to hospital and given penicillin, 20,000 units every three hours. At this stage the heart sounds were normal. In two days he was afebrile and the local lesions were healing. On August 28 his temperature began to rise again, and a soft systolic murmur appeared in the mitral area; the temperature rose to 103° F., and fresh petechiæ appeared on his feet. The systolic murmur at the apex became harsher in character, and a murmur appeared in the aortic area and grew more intense. The heart began to dilate, and on August 29 the apex beat was in the sixth left intercostal space, five inches from the mid-line. The pulse rate increased, and the patient had mild dyspnœa. The dosage of penicillin was increased to 40,000 units every three hours, and a course of sulphadiazine was begun. At midnight on August 29 a rapid course of digitalis was begun, "Digoxin" being administered in doses of 1·5 milligrammes, 1·0 milligramme and 0·5 milligramme at intervals of six hours. The patient responded well to "Digoxin", though his temperature remained elevated. He had a history of rheumatic fever and a "leaking valve".

On the patient's admission to Saint Vincent's Hospital, he gave a history of generalized aches and pains of two weeks' duration, of pain in the fingers and toes of one week's duration, and of dyspnœa of one week's duration. He had suffered from rheumatic fever in 1933. On examination, he was found to have a temperature of 99° F.; his pulse rate was 78 per minute and his respirations numbered 20 per minute. The patient was in no respiratory distress; there was no evidence of cyanosis or venous engorgement; his face was flushed. On the tips of the fingers and toes were small painful areas, one centimetre in diameter, slightly raised above the surrounding skin; the lesions were purplish in colour and very tender. Scattered over the trunk were small, bright red petechiæ, disappearing on pressure. Under the nails of the fingers and toes longitudinal hæmorrhages were present. The pulse beat was regular in time and amplitude; Corrigan's pulse was present. The systolic blood pressure was 180 millimetres of mercury, the diastolic pressure 50 millimetres and the pulse pressure 130 millimetres. The apex beat was forceful, heaving and diffuse; it was in the sixth intercostal space, six inches from the mid-line. A systolic murmur was heard at the aortic area, propagated up into the neck. A diastolic murmur, replacing the second sound, was propagated down the left side of the sternum. No thrills were detected. A systolic murmur and a short early diastolic murmur were detected in the mitral area. A Duroziez murmur was present. Capillary pulsation was present. No abnormality was detected in the chest. The spleen was palpable two inches below the costal margin. The urine was free from abnormality. No evidence of embolism was detected on examination of the optic disks.

The patient's temperature rose to 103·2° F. after twenty-four hours, but fell to normal in the next two days and remained so. His pulse rate remained steady at 70 to 80 per minute. Throughout most of the illness the systolic blood pressure was 150 millimetres of mercury and the diastolic pressure ranged from zero to twenty millimetres of mercury. During the first ten days in hospital the spleen diminished in size, and it remained barely palpable. A few fresh Osler nodes and splinter hæmorrhages appeared in the first few days, but they all gradually disappeared, the skin over the Osler nodes becoming coarsely desquamated. The urine remained free from abnormality throughout. The

heart gradually became smaller, the apex beat moving in to the fifth intercostal space five inches from the mid-line; but during the month prior to the meeting the heart had undergone secondary dilatation, and the apex beat was now behind the sixth rib, six inches from the mid-line. The basal to-and-fro murmur had remained unchanged; but at the apex, in addition to the systolic murmur, an Austin Flint murmur had appeared in the past few weeks. The patient had felt very well since his first week in hospital, and had had no dyspnœa or other cardio-vascular symptoms and no rigors.

A number of special investigations were carried out. Blood was examined by cultural methods on three occasions; on September 2 a moderate growth of *Staphylococcus aureus* was obtained, and a contaminant; on October 10 and 16 no growth of microorganisms was obtained. A series of blood counts gave the following information. On September 2 the leucocytes numbered 33,000 per cubic millimetre, 84% being neutrophile cells, 8% lymphocytes, 5% monocytes, 2% eosinophile cells and 1% basophile cells. On September 5 the leucocytes numbered 10,500 per cubic millimetre, 8% being eosinophile cells. On September 17 the erythrocytes numbered 4,340,000 per cubic millimetre, the hæmoglobin value was 12·4 grammes *per centum* and the colour index was 0·95. On September 24 the erythrocytes numbered 4,180,000 per cubic millimetre, the hæmoglobin value was 11·1 grammes *per centum* and the colour index was 0·88; the leucocytes numbered 8,500 per cubic millimetre, 9% being eosinophile cells. On October 2 the leucocytes numbered 9,000 per cubic millimetre, 12% being eosinophile cells. On October 10 the leucocytes numbered 8,400 per cubic millimetre, 7% being eosinophile cells and 50% neutrophile cells. On October 22 the erythrocytes numbered 5,300,000 per cubic millimetre, the hæmoglobin value was 15·6 grammes *per centum* and the colour index was 0·98; the leucocytes numbered 10,200 per cubic millimetre, 3% being eosinophile cells. An electrocardiogram made on September 21 was considered to be "within normal limits". The stools were examined for ova, but no ova were found. The Casoni test failed to produce a reaction. The urine was consistently normal, and never contained any red cells or albumin. The patient was treated by the administration of penicillin, 100,000 units every three hours for ten days and then 50,000 units every three hours to a total of 16,500,000 units. Sulphadiazine was also given orally to a total of 59 grammes, and iron was exhibited.

Addison's Disease.

The second patient shown by Dr. Burke on behalf of Dr. R. J. Taylor was an unmarried man, aged forty-four years, a railway worker, who had been admitted to hospital on December 1 and discharged from hospital on December 31, 1945. On his admission to hospital the patient complained of asthenia, anorexia, vomiting and diarrhœa, all of one week's duration. He showed evidence of considerable loss of weight, and brownish pigmentation was present in the skin, most pronounced on the face and on the exposed parts of the forearms and hands. The patient had first become ill about four years previously. At that time he complained of vomiting and of a sense of fullness after meals. The diagnosis of duodenal ulcer was confirmed by X-ray examination. He obtained some relief by a suitable diet. His condition remained the same for twelve months, and then he began to lose weight; he lost about six stone in ten months, and also complained of anorexia and considerable asthenia. In addition he had frequent attacks of vomiting and syncope. He was admitted to hospital, and was later discharged, feeling better; but he still suffered numerous exacerbations of his symptoms. His appetite was good between attacks, and a crisis was always preceded by increasing anorexia. He had no symptoms referable to the cardio-vascular or respiratory systems.

On examination of the patient, pronounced pigmentation was found on the exposed surfaces and over pressure points; brownish pigmentation was also present on the face, lips, forearms, scrotum, penis and nipples. Black areas of discoloration were observed on the tongue and on the buccal mucosa. The patient was asthenic in appearance, showing evidence of great loss of weight. The systolic blood pressure was 95 millimetres of mercury and the diastolic pressure 70 millimetres; the temperature was 98° F., the pulse rate was 80 per minute and the respirations numbered 20 per minute. Neither the liver nor the spleen was palpable. The apex beat was detected in the fifth left intercostal space, three and a half inches from the mid-line; no murmurs were heard. The chest was free from abnormality. No abnormal signs were detected in the nervous system. A provisional diagnosis of Addison's disease was made.

The patient was treated first of all by the administration of extra salt with the diet. For twenty days one millilitre of desoxycorticosterone acetate was given each day by intramuscular injection. Then, on December 20, 1945, the rectus sheath was incised vertically through a right paramedian supraumbilical skin incision, and four fifty-milligramme tablets of desoxycorticosterone acetate were inserted. During treatment the patient's blood pressure did not rise above 100 millimetres of mercury (systolic) and 70 millimetres (diastolic); but his symptoms were considerably relieved. Dr. Burke said that since his discharge from hospital he had felt well and had been able to carry on his work without inconvenience.

NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioner has been released from full-time duty with His Majesty's Forces and has resumed civil practice as from the date mentioned:

Dr. J. F. N. Thomas, 154, Sailors Bay Road, Northbridge, New South Wales (March 12, 1947).

Medical Societies.

THE PUBLIC MEDICAL OFFICERS' ASSOCIATION OF NEW SOUTH WALES.

THE twenty-first annual general meeting of the Public Medical Officers' Association of New South Wales was held at British Medical Association House, 135, Macquarie Street, Sydney, on January 23, 1947. Dr. W. K. Flook, the President, was in the chair and twenty members were present.

Financial Statement.

The Honorary Treasurer, Dr. G. C. Smith, submitted a satisfactory financial statement for the year 1946, which was adopted.

Annual Report.

The Honorary Secretary, Dr. H. Hastings Willis, submitted the committee's annual report and explained it. The report is as follows.

During 1946 conditions in the services reflected the greatly unsettled political and economic state of the nation, and most public medical officers carried out their duties under great difficulties. Consequently, the Association's activities were restricted as in the years of war.

The membership roll of the Association contains 112 names, of which 11 are those of retired persons retained on the list as honorary members. A larger membership, if possible, is desirable.

The committee met seven times during as year, as and when business necessitated. Attendance of members was as follows:

Dr. W. K. Flook (President)	7
Dr. A. T. Edwards	7
Dr. E. T. Hilliard	3
Dr. Edgar Wallace	7
Dr. J. McManamey	7
Dr. G. C. Smith	5
Dr. Dorothy McClemens	2
Dr. J. McF. Rossell	3
Dr. H. H. Willis (Secretary)	7
Dr. G. C. Saxby	3

The committee recommends, pursuant to Rules 9 and 11, that groups be represented on the committee during 1947, as follows:

	Representatives.
New South Wales State Health Department	4
Mental Hospitals	3
Educational Medical Services	2
Works and Railways Medical Officers	1
Repatriation Department	1

The agreement with the New South Wales Public Service Board, covering salaries for a period of three years from April 1, 1945, which was approved by the annual general meeting of January, 1946, was completed by the Board and dated on June 4, 1946; the salaries were payable retrospectively from April 1, 1945. The period has been too short since the signing of the agreement and the times too

unsettled to enable an opinion to be formed as to whether this salary scale will attract sufficient of the right type of practitioner to maintain the efficiency of the public medical services of New South Wales. So far the more attractive remuneration and conditions of service offered by the Federal Government have prevented the State services securing sufficient medical staff to enable certain grievances regarding leave to be rectified.

In March the committee ranged the Association behind the agitation conducted by the Public Service Association of New South Wales for the abolition of the means test as applied to the granting of old-age and invalid pensions by the Federal Government. The fruits of the agitation are not yet apparent, but success is expected to be attained gradually over a number of years.

Representations were made to the Public Service Board seeking an increased allowance for the removal of furniture when a medical officer is transferred from one institution to another. The Board refused the request, but it is hoped to secure redress in individual cases by other means.

In June, 1946, the New South Wales Branch of the British Medical Association invited the committee to nominate a representative of the public medical officers for cooption to its Medical Politics Committee as in some former years, but on this occasion indicated in the same letter the individual the Council desired to be nominated. On these conditions the committee declined the invitation to nominate and informed the Council of the New South Wales Branch of the British Medical Association that the committee considered that cooption by the Council of the British Medical Association to one of its committees was not a satisfactory method of ensuring representation of public medical officers in the counsels of the British Medical Association.

On November 15, 1946, £400 worth of 2½% Commonwealth bonds held by the Association matured and were converted into bonds in a new loan maturing in October, 1958, and bearing interest at 3½%. During the year assistance was given by the officers of the Association to two members of the Association who sought rectification of salary anomalies. Both cases ended satisfactorily.

Towards the end of the year the committee reviewed the progress made by the New South Wales State authorities in meeting the Association's request for improved conditions of service, which had been promised favourable consideration by the New South Wales Public Service Board and the heads of departments. It is regretted that very little progress has been made. While full allowance must be made for difficulties arising from the unsettled state of the community consequent upon the recent war, it is felt that something more could and should be done. This matter should receive the earnest attention of the incoming committee.

Election of Office-Bearers.

The following were elected office-bearers for the year 1947:

President: Dr. Grace Cuthbert.
Honorary Secretary: Dr. A. T. Edwards.
Honorary Auditor: Dr. J. McGeorge.
Committee: Dr. J. McManamey, Dr. Edgar Wallace, Dr. G. C. Smith and Dr. England (Health Department), Dr. E. T. Hilliard, Dr. S. Evan Jones and Dr. H. H. Nowland (Mental Hospitals), Dr. W. K. Flook and Dr. Dorothy McClemens (Education Department), Dr. J. McF. Rossell (Works and Railways), and Dr. G. C. Saxby (Repatriation Department).

Other Business.

A motion was carried instructing the committee to continue its representations to the Public Service Board concerning working conditions, notably quarters and leave, as was also a motion instructing the committee to investigate the question of registering the Association as a trade union and to report to a general meeting of the Association.

A motion that the Public Service Board be asked to increase the commencing salary for medical officers in the New South Wales service to £800 *per annum* was lost because an agreement was concluded with the Board last year which was considered binding on the Association until April 1, 1948.

A motion that the Association make representations to the New South Wales Public Service Board concerning rates of pay for female medical officers was carried.

The meeting concluded with a vote of thanks to Dr. Flook for his services as President during 1946 and an expression of appreciation of the services of the retiring Honorary Secretary, Dr. H. Hastings Willis, during his twenty years' tenure of that office.

Correspondence.

THE ZOOLOGICAL POSITION OF MAN.

SIR: The correspondence on my address, "The Zoological Position of Man", seems to have largely settled down to a controversy between Professor Abbie and "Criticus" in which "Criticus" often brings up issues which appear to me either irrelevant or not generally accepted. However, I would like to discuss some of his remarks a little further.

1. With his criticism of the title, I am partly in agreement, though I regard my own title as by no means inept. Actually, I was asked to give a title to my address before I had given much thought to the matter; hence any slight imperfection.

2. I still maintain that Huxley's "Evolution, the Modern Synthesis" is a most masterly synthesis of our present outlook not only on evolution in general, but also in broad outline upon the evolution of man. Workers such as Broom, Hooton, Keith and others have given us splendid detailed studies, but few have looked at the problem with the detachment or the breadth of view of Huxley, and they can all, I believe, relearn much from him.

3. Whether there are three successive species, for example, *Homo erectus, Homo intermedius* and *Homo sapiens*, or whether all the various races of these three groups were simply races of the one species is, as I think Weidenreich pointed out, largely an academic question, as it is doubtful if we can ever prove whether a modern Englishman and a Peking woman were interfertile or not. Nevertheless, I still consider there is some justification for Weidenreich's grouping, which I have adopted. In any complete phylogenetic series it must often be a difficult and somewhat arbitrary matter as to where we place the dividing line between successive species.

5. Some of the evidence for the gradual acquisition of conceptual thought and the development of speech may be found in the studies of Elliot Smith on the gradual development of the speech areas as seen in the casts of the brain in fossil man, while the later stages are obvious from any study of prehistory such as that of Gordon Childe, or of early civilizations as in Breasted or Elliot Smith again.

6. Progressive enlargement of the brain is true in general, despite the apparent discrepancy seen in the large size of a few of the Neanderthal brains. For we must remember that the upper range of size of the modern human brain is above that of the largest of the Neanderthal brains, while Elliot Smith has also put forward some evidence to suggest that the brain of Neanderthal man was less highly organized than that of modern man. It is, of course, obvious that size is only one factor, activity and organization being just as important.

8. In regard to Dryopithecus, I simply gave the generally accepted view that probably Dryopithecus was nearer to man's early anthropoid-like ancestors than any other form known at present. This view may alter and in fact has been contested by Le Gros Clark since I gave my address. This does not, however, materially affect my general argument, as the other forms found in South Africa which may be nearer the line of man's ancestry would serve equally well to illustrate my point.

9. As regards the classical theory of the gene, I have previously stated my position, but might aptly refer to the remarks of a young geneticist who said "Most geneticists don't even bother to refute Goldschmidt" whose point of view "Criticus" supports.

13. "Criticus" seems to misunderstand my thesis, which as Professor Abbie points out is that while we have masses of measurements and observations of the human body and its bones, many of these are probably not of much significance, the significant ones being those which can be related to the genes, and our best method of determining these is by studies in heredity, for example, the various genetic studies upon the cephalic index.

15. As regards man being continuously sexed, various suggestions have been put forward to explain this phenomenon; I put forward one by Huxley, another by Stump, and others could be put forward. As I said, many of these phenomena (including the above) need reexamination and further study and neither suggestion was meant to be final.

16. I was particularly careful not to reject telepathy or extrasensory perception, but was more cautious than "Criticus", for I am informed that Rhine's evidence had been questioned by the statisticians.

With regard to other correspondents, Dr. Alice Barber refers to the inadequacy of the term extrasensory perception. I find that I also used the term telepathy, which may be more suitable, and in any case I only used the accepted terms for these phenomena.

In conclusion, I am glad to see that "Criticus" presumably agrees with some of the findings of my address, while many that he disagrees with are possibly related to the evident differences in mentality between us, "Criticus" having a strong penchant for destructive criticism as he himself indicates, while I believe I have given a reasonable summary of the more generally accepted views of the present day, enlivened by legitimate speculation, an attitude which is in my opinion both stimulating and productive of further effort, whereas destructive criticism, while often valuable, can only too frequently in my experience have a sterilizing effect.

Yours, etc.,

A. N. BURKITT,
Professor of Anatomy.

Department of Anatomy,
University of Sydney,
March 1, 1947.

[This correspondence is now closed.—EDITOR.]

INTRAVENOUS ADMINISTRATION OF OXYGEN.

SIR: In your issue of March 15 there is a report of a communication to the New South Wales Branch of the British Medical Association by Dr. Buchanan on the subject of intravenous administration of oxygen. I should like to state that about thirty years ago I was greatly attracted by this idea and conducted over fifty experiments on laboratory animals in which oxygen was administered intravenously in fine bubbles during asphyxia. If my recollection is right I demonstrated the method as a class experiment in my lectures on physiology to medical students. Certainly some degree of betterment ensued, but it was short-lived and invariably signs of embolism (confirmed by post-mortem inspection) became evident later. As the oxygen first used contained about 4% of nitrogen I employed electrolytic oxygen, but still with the same result. The late Professor J. S. Haldane whom I consulted informed me that he also had tried intravenous oxygen, but like myself had found embolism supervening; this embolism he attributed to nitrogen diffusing into the oxygen bubbles from the blood and the lungs. We both agreed that the method was too dangerous to employ in the human subject and so I let the research drop. May I point out in conclusion that though intravenous oxygen may alleviate anoxæmia temporarily, it can do nothing towards counteracting the banking up of carbon dioxide—it may actually increase this—which is just as important as oxygen lack?

Yours, etc.,

W. A. OSBORNE.

Kangaroo Ground,
Victoria,
Australia.
March 17, 1947.

AN AUSTRALIAN TUBERCULOSIS ASSOCIATION.

SIR: Your leading article in the journal of March 1 is a very timely contribution. Tuberculosis being a communicable disease, the main responsibility for its control rests upon governments, Federal and State. There seems to be general agreement amongst those best qualified to judge that governments have failed to meet their responsibilities squarely, and that the organization for tuberculosis control in Australia is sadly lacking in many respects.

Plans and planning there have been in abundance. In 1929 Dr. M. J. Holmes, of the Commonwealth Health Department, after an exhaustive survey of conditions in all the States, prepared a comprehensive report and made specific recommendations, but nothing came of all this. In September, 1943, at the request of the Commonwealth Minister for Health, each State drew up a plan for control in its own area. Periodically we hear that something is going to be done, but nothing is done. Certainly the Commonwealth Government passed a *Tuberculosis Act* to provide financial relief for sufferers, but the amount made available was totally inadequate for the purposes required. Similarly it made funds available for after care, but it left uncorrected conditions that make the success of after care centres almost impossible to attain. It ignores, or at any rate it fails to act on, the advice of its own advisory committees. It is difficult to see the use of such committees unless their opinions are heeded and are acted upon.

Whether measures to safeguard the health of the people ultimately become a Federal responsibility or whether they remain within the domain of the State Governments, it is likely that the actual work will be carried out by local health authorities. It behoves each State then to put its house in order. It is pleasing to note that the Commonwealth Division of Tuberculosis is to be resuscitated, and is to be placed in the charge of a medical officer especially appointed for the purpose. It will be a difficult job for a keen man if he does not receive wholehearted official support.

It is not much use for medical men to moan at official shortcomings if they are not prepared to put a shoulder to the wheel themselves. An active Australian Association for the Prevention of Tuberculosis could do a lot of good in stimulating both official and unofficial efforts to stamp out the disease. But each State must be ready to play its part, and the first step is to form a local association which would link up with other State associations to form a strong national body. It seems that nothing short of an enlightened public opinion will suffice to stir the authorities into activity.

Yours, etc.,

D. R. W. COWAN.

163, North Terrace,
Adelaide,
March 10, 1947.

SOME RULES FOR THE EMPLOYMENT OF LOCAL ANALGESIA IN THE TREATMENT OF SOMATIC PAIN.

SIR: In his discussion on the above method of treatment in THE MEDICAL JOURNAL OF AUSTRALIA, February 22, 1947, page 235, Dr. Kelly has stated: "It must be admitted that the method has not been well served by its over-enthusiastic protagonists, who too often have claimed dramatic successes in the vast majority of cases."

Dr. Kelly has evidently forgotten that in an article entitled "The Treatment of Fibrositis and Allied Disorders by Local Anæsthesia", THE MEDICAL JOURNAL OF AUSTRALIA, March 8, 1941, page 294, he wrote: "In the greater number of cases of low back pain I have been able to find a single causative nodule, infiltration of which with a 1 in 1,500 solution of 'Percaine' gives immediate relief and is followed by permanent cure" and "Of 49 cases, a nodule was discovered and successfully infiltrated in 43". Surely a "vast majority" of cures!

In 1947 he writes, "I find that my proportion of cures remains the same", yet in Table I, numbers 9 and 12, he refers to the prospects of cure of lesions in low back pain as 1 in 4. Surely not "the same" proportion of cures as 43 out of 49 which he claimed in 1941!

Is there any more over-enthusiastic protagonist of the employment of local analgesia in the treatment of somatic pain than Dr. Kelly himself?

Yours, etc.,

MARION A. RADCLIFFE-TAYLOR,
M.B., Ch.B., F.R.C.S.E.,

Beverley,
Western Australia,
March 15, 1947.

DR. BETHUNE OF CHINA.

SIR: The appreciative notice in your issue of March 8 of Trueta's work in the Spanish Republican Army reminds me of another little known surgeon of that group who also "did not suffer in vain".

In 1938, when my hospital in Hankow, Central China, was acting as a base hospital for the Chinese armies who were being pushed up the Yangtze River by the Japanese offensive, there turned up one day a young Canadian, Dr. Bethune.

He told us he had worked with the Spanish Republican Army, and was very proud of the blood bank system which he had helped to organize there, especially during the siege of Madrid. It was the first time this had been used in military work and it had saved many lives. As he was an enthusiastic communist, and the Spanish cause had been lost, he was now on his way to join the communist forces fighting in Shansi. He collected from us various samples of orthopædic apparatus suitable for local manufacture in Chinese cooperative shops and pushed on up north and out of our ken.

It was only years later that we heard what he did. For two years he lived and worked with the Communist Eighth Route Army, almost the only doctor from the outer world to assist them. He lived on the coolie food of the Chinese soldier and almost no salary. He worked with a pitifully scanty supply of drugs and dressings and with instruments many of which had to be improvised. There certainly would be no facilities for organizing a blood bank. But he did help to organize a field ambulance service, pushed right up behind

the fighting lines, a facility never before enjoyed by Chinese soldiers. As the military equipment of these forces was such that only guerrilla tactics could be used, all hospitals had to be prepared to move at very short notice. Accordingly casualty clearing stations were so organized with mule and stretcher-bearer transport, and so equipped, that the whole hospital could be mobilized and take the road in half an hour's time when required. He gave himself unstintedly for his comrades of another race and eventually died of septicæmia contracted during the extraction of a soldier's tooth.

His memory is a watchword through the whole communist territory of the north-west, and they have called their principal base hospital at Yenan "The Bethune Memorial Hospital".

Yours, etc.,

320, Piper Street, H. OWEN CHAPMAN.
Bathurst,
New South Wales.
March 10, 1947.

THE TREATMENT OF THYREOTOXICOSIS BY CONCURRENT ADMINISTRATION OF THIOURACIL AND IODINE.

SIR: Prolonged treatment of thyreotoxicosis with iodine, prior to administration of thiouracil, greatly delays the therapeutic effect of the latter drug.

No such delay occurs if thiouracil and iodine are given concurrently.

In the communication of Mr. Poate and Mr. Spencer (THE MEDICAL JOURNAL OF AUSTRALIA, February 22, 1947) they still apparently fail to appreciate this distinction, which is the fundamental reason for the difference in our viewpoint concerning the treatment of thyreotoxicosis.

Yours, etc.,

61, Collins Street, IVAN MAXWELL.
Melbourne,
March 11, 1947.

CHILBLAINS.

SIR: In the journal for January 25, 1947, appears a "Current Comment" article on chilblains.

I am one of the "few" who "will quarrel with the conclusion that none of the remedies listed can be considered specific".

As a child in England I suffered severely. In France during the 1914-1918 war I at times had the warnings, but I carried with me the specific remedy which never failed, and it has never failed in the case of any for whom I have prescribed it.

Undoubtedly the condition is familial, and in treatment it is necessary to use common sense with regard to clothing, for example, footwear must be warm and the feet must be free from pressure of tight shoes. Appropriate and common-sense care must be taken of hands, ears *et cetera*.

The specific remedy is calcium chloride internally. Calcium chloride is probably the most efficient of calcium preparations, being rapidly absorbed. The objectionable taste is overcome by the use of a liberal amount of syrup (for example, *Syrupus Aurantii*) and chloroform water. For an adult the following prescription is ideal: Calcium chloride, fifteen grains; syrup of orange, two drachms; chloroform water to half an ounce—to be taken in adequate quantity of water thrice daily after food until the condition is relieved. Of course, the treatment must be commenced early to prevent local complications.

Yours, etc.,

"CA DEFICIENT".
Brisbane,
March 14, 1947.

Public Health.

MEDICAL STANDARDS FOR CIVIL FLYING: APPLICATION OF NEW REGULATIONS TO THE AUSTRALIAN COMMONWEALTH.

THE following statement is published at the request of Air Commodore E. A. Daley, Director-General of Medical Services (Air).

For many years past the International Convention for Air Navigation (I.C.A.N.) has been the authority laying down the various requirements (including medical standards) for civil flying as applied to all signatories of that convention. Australia as a signatory applied these regulations in their various forms.

Recently a new International Convention was organized to go into the question of all aspects of the requirements and standards for civil flying. From this convention originated new recommendations and standards to be applied to the various nations concerned, and these included, of course, certain new medical requirements. The name given to this convention was P.I.C.A.O., which means Provisional International Civil Aviation Organization, and the standards are therefore referred to as "P.I.C.A.O. standards" as against "I.C.A.N. standards", the previous authority.

The medical aspects were set out after much discussion and indicate what must be regarded for the present as minimal provisional requirements only, expected of applicants for the various types of flying licences. These medical standards include: (*a*) physical standards, three grades; (*b*) ophthalmic standards, three grades; (*c*) auditory standards, four grades; (*d*) colour vision standards, two grades.

There has been an increase and modification in the number and type of flying licences available, the medical standards varying for each particular licence, the highest, of course being that required of the airline transport pilot carrying passengers for hire.

It has been left to each country to decide what modifications and higher standards, if any, should be made in the application of these minimal standards agreed upon by the Provisional International Civil Aviation Organization.

At a recent meeting of the Provisional International Civil Aviation Organization, held during January, 1947, in Canada, recommendations regarding modifications to these initial medical requirements were considered by the nations involved. Australia was represented and certain recommendations from this country were put forward.

In the meantime, however, for the benefit of all authorized medical examiners of the Civil Aviation Department and others concerned and interested, it is desired to indicate that "P.I.C.A.O." medical requirements, as minimal standards, become applicable to the Australian Commonwealth on May 1, 1947, replacing the "I.C.A.N." which are in force until that date. With the adoption of these, however, certain departures of a conservative nature will be observed until further notice.

Information setting out the complete "P.I.C.A.O." medical standards and modifications regarding their application to the Commonwealth of Australia will be circulated to all authorized examiners as soon as practicable by the Department of Civil Aviation. Amendments, as these are decided upon by later international conferences from time to time and become applicable to the Commonwealth, will also be brought to notice by circular.

On receipt of these all authorized examiners are earnestly requested to familiarize themselves with the new standards as soon as possible.

ANKYLOSTOMIASIS IN EX-SERVICE PERSONNEL.

THE secretary of the Commission of Public Health of Victoria wishes it to be known that the Repatriation Commission has advised his office of the names of ex-members of the forces who have been instructed to report for further investigation and treatment for hookworm disease and who have failed to carry out this instruction. The medical officer of health of the district in which the defaulter resides is to be advised by circular letter. The Commissioner of Public Health is anxious to enlist the cooperation of private medical practitioners in dealing with infested ex-service patients. Treatment is provided for these patients by the Repatriation Commission at base hospitals.

Obituary.

HERBERT CRICHTON McDOUALL.

DR. OLIVER LATHAM has sent the following appreciation of the late Dr. Herbert Crichton McDouall.

Many of the older psychiatrists of this State were reminded of other days on seeing the recent notice of Crichton McDouall's death at eighty-seven. He was the seventh and only surviving son of the late J. C. S. McDouall, who, first taking up land near Stockton on arriving from England in 1840, eventually owned "New Freugh" in the Singleton district. Educated first at Singleton Grammar School,

McDouall also was a pupil at "Trinity Grammar School", which he remembers as a small affair in Elizabeth Street. In 1879 he sailed for England, and, studying medicine at King's College, became one of Lister's dressers. Taking his M.R.C.S. and L.R.C.P., for a short time he practised in Newcastle, New South Wales. About 1884 he took up psychiatric work at Gladesville. Soon he found further study was desirable if he was to make a success of this specialty, and as those who knew his conscientious nature would have foretold, spared no expense once his duty seemed clear, and so again sailing for England, obtained the D.P.H. diploma at Cambridge in 1899. Returning with a wife, he rejoined the service from which he eventually retired in 1925. After a term at Callan Park, he was from 1905 to 1925 Gladesville's medical superintendent. Such was his interest in and love for his patients that no trouble appeared too much for him, and his patience in listening to every complaint or wish a patient might make on the rounds caused these rounds to be expanded to great lengths as those who accompanied him well remember. His consideration for patients' friends was on a like basis. He was a deeply religious man, and he satisfied these feelings not only by outward church services, but also by encouraging any efforts which might add to the comforts of his patients.

Some forty years ago Miss E. Paterson, of Rockend, Gladesville, commenced turning little visits to the patients into something more regular and comforting. Tea was provided and cakes and pleasant conversations. Soon, however, the idea developed that a hostel might be obtained where women patients without friends might stay a week or so and feel their feet as it were after years in a mental hospital. Years were to elapse before this could be managed, and McDouall became president of the little "After Care Association of N.S.W." from the very first.

However, eventually a handsome building was obtained at Fivedock capable of housing ten patients as well as a supervisor. This venture was costly, but the establishment of canteens both at Gladesville and Callan Park mental hospitals solved the expense problem. At first voluntary labour sufficed, chiefly owing to the remarkable help McDouall received from the Ebsworths of Hunter's Hill and their associates and friends of the association. Paid assistance became necessary owing to the great expansion of the undertaking, the present annual turnover approaching five figures. These canteens or shops, long established in certain British institutions, enabled patients of both sexes to purchase tobacco, cakes, groceries and sewing materials without leaving the hospital grounds. Besides, they obtained afternoon tea and scones, ice cream *et cetera* wherewith to entertain their relatives and friends under pleasant circumstances in the handsome grounds. A paid general secretary had long been employed to visit patients at other mental hospitals and discuss suitable recruits for the hostel and find jobs for both sexes. The successive governments of New South Wales, recognizing the value of the work, handsomely helped with the secretary's salary and other gifts, and the present Government with their promise of a capital sum seem likely to realize McDouall's ultimate goal to provide as well a hostel for men. The main organizing work and mainspring of encouragement came from McDouall's fostering care and interest.

But besides all this McDouall was a man of public spirit. He was a life governor and deputy chairman of the British Empire Union, a member of the Church of England Emigration Society, British Settler's Welfare League and Church of England Grammar School for girls at Longueville. Now for his recreations. Besides presiding over the activities of the old Hunter's Hill Golf Club (on the hospital grounds) he early employed nearly all his leave joining various companies in Leura and encouraging them to purchase various holdings and abandoned mining claims on which eventually the Leura golf links were laid out. He even got rights procured over some areas containing bubbling springs, and a suitable patch of high ground near the club house where eventually a number of tanks reticulated water over the finest of the mountain links. He was one of the earliest presidents of the golf club there. Lastly he early gave "tone" to these links by building a fine stone mansion alongside the first hole, and in innumerable other activities and ways must be considered one of the real founders of Leura's premier position in the sporting and holiday world. He is survived by six daughters, a granddaughter and five grandsons, with the former of whom (his wife predeceased him five years) he spent his twenty-two years of retirement in the happiest of family circles in his Warrawee home. There he added gardening to his other activities, and in the first ten years of his retirement joined the honorary staff of the Royal North Shore Hospital and conducted a psychiatric clinic.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Numbers 33 and 50, of February 20 and March 13, 1947.

ROYAL AUSTRALIAN AIR FORCE.

Citizen Air Force: Medical Branch.

Temporary Squadron Leader S. M. L. Dunstone (281654) is called up from the Reserve to the Active List for part-time duties, 1st January, 1947.—(Ex. Min. No. 15—Approved 19th February, 1947.)

Flight Lieutenant (Acting Squadron Leader) L. C. Rowan (253729) is granted the acting rank of Wing Commander whilst occupying a Wing Commander post, 13th December, 1946.

The appointments of the following officers are terminated on demobilization: Temporary Squadron Leaders D. J. Dowling (253441), G. B. Morris (262082), 30th January, 1947; Flight Lieutenants L. C. Doubleday (267797), 22nd January, 1947, C. W. Whitelaw (267410), 28th January, 1947.

Congresses.

THE AMERICAN SOCIETY FOR THE STUDY OF STERILITY.

THE third annual convention of the American Society for the Study of Sterility will be held at the Hotel Strand, Atlantic City, New Jersey, on June 7 and 8, 1947, preceding the annual American Medical Association Convention The convention will include original papers, round table discussions, scientific exhibits, and personal demonstrations. Registration for the sessions is open to members of the medical and allied professions.

Additional information may be obtained from the secretary, Dr. John O. Haman, 490, Post Street, San Francisco.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Lang, William Robson, M.B., B.S., 1945 (Univ. Sydney), Kurrajong, Penshurst Street, Willoughby.

Fitzherbert, John Crouch, M.B., 1943 (Univ. Sydney), 8, Lyndhurst Gardens, Rosemont Avenue, Woollahra.

Huth, Emil, M.B., B.S., 1946 (Univ. Sydney), 679, New South Head Road, Rose Bay.

The undermentioned have been elected as members of the Western Australian Branch of the British Medical Association:

Ambrose, John Rosslyn, M.B., B.S., 1943 (Univ. Adelaide), 176, Suburban Road, South Perth.

Newnham, William Arthur, M.B., B.S., 1946 (Univ. Adelaide), 52, Esplanade, Peppermint Grove.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Practitioners Act*, 1938-1939, of New South Wales, as duly qualified medical practitioners:

Bosanquet, Robert Eric, M.B., Ch.B., 1942 (Univ. Edinburgh), Birwood Post Office, Forbes River, via Wauchope.

Chong, Raymond Victor, M.B., B.S., 1941 (Univ. Melbourne), 2, Wharf Road, Longueville.

Higson, William James Basil, M.B., B.Ch., 1943 (Queen's Univ. Belfast), 11, Belmore Street, Bowral.

Jones, George Russell, M.B., B.S., 1943 (Univ. Melbourne), Nyah West, Victoria.

Landor, Joseph Victor, M.R.C.S., 1920 (England), L.R.C.P., 1920 (London), M.B., B.S., 1920 (Univ. London), M.D., 1925 (Univ. London), D.P.H. (R.C.P. and S., England), 1926, D.T.M. and H., England, 1927, M.R.C.P., London, 1932, c.o. Bank of New South Wales, Sydney.

Morris, James Ross, M.B., B.S., 1940 (Univ. Melbourne), Wentworth.

Rundle, Alfred Jean, M.R.C.S. (England), L.R.C.P. (London), 1945, c.o. Hotel Metropole, Sydney.

Simpson, Gladys Winifred, M.B., B.S., 1940 (Univ. Melbourne), Wentworth.

Strang, Robert Philip, M.R.C.S., L.R.C.P., 1940, M.R.C.P. (London), 1946, c.o. Bank of Australasia, Sydney.

Cohn, Siegfried, approved for registration in terms of Section 17 (B) of the *Medical Practitioners Act*, 1938-1945, 17, Keating Street, Maroubra.

AN APPEAL.

DR. J. B. GERBERICH, of the Department of Biological Science, Michigan State College, East Lansing, Michigan, United States of America, has written making an appeal for reprints, copies of unpublished manuscripts and results of observations in connexion with the biological control of mosquitoes. He wishes to bring the information together in the form of annotated biographies.

CRICKET MATCH.

THE annual cricket match between teams representing the British Medical Association and the Australian Dental Association in New South Wales was played at the Sydney Cricket Ground on March 12, 1947.

The medical men won by 89 runs on the first innings.

The scores were as follows:

Australian Dental Association.

A. Barnett, l.b.w. Foulsham	7
W. Thompson, b. Farrar	14
B. Smith, l.b.w. Foulsham	7
K. Binns, c. Foulsham, b. Bettington	16
A. Laws, b. Foulsham	2
O. Hall, st. Johnson, b. Bettington	6
E. Morris, b. Lawes	10
A. Smith, b. Bettington	6
M. Cusick, n.o.	2
T. Cottee, c. Bettington, b. Lawes	4
H. Croxon, b. Lawes	0
Sundries	2
Total	76

Bowling: Calov, 0 for 12; Foulsham, 3 for 27; Farrar, 1 for 5; Bettington, 3 for 19; Lawes, 3 for 9.

British Medical Association.

A. Edwards, l.b.w Binns	0
F. Leventhal, c. Cottee, b. Thompson	38
F. Farrar, b. Smith	37
W. Foulsham, retired	41
R. Bettington, c. and b. Thompson	14
C. Lawes, st. Smith, b. Croxon	5
P. Heffernan, n.o.	3
Alex Johnson, b. Barnett	10
W. Calov, c. Binns, b. Cusick	4
Adrian Johnson, n.o.	4
J. Goldman, c. and b. Binns	1
Sundries	8
Total	165

Bowling: Binns, 2 for 27; Morris, 0 for 33; B. Smith, 1 for 21; Thompson, 2 for 35; Croxon, 1 for 21; Hall, 0 for 7; Barnett, 1 for 5; Cusick, 1 for 4; Cottee, 0 for 4.

Books Received.

"Atlas of Histopathology of the Skin", by G. H. Percival, M.D., Ph.D., F.R.C.P.E., D.P.H., A. Murray Drennan, M.D., F.R.C.P.E., F.R.S.E., and T. C. Dodds, F.I.M.L.T., F.I.B.P., F.R.P.S.; 1947. Edinburgh: E. and S. Livingstone, Limited. 10¾" x 6", with many coloured illustrations. Price: 75s.

"Urgent Surgery", Volume I, edited by Julius L. Spivack, M.D., LL.D.; 1946. Illinois: Charles C. Thomas. 9¾" x 6¼", pp. 726, with many illustrations. Price: $10.00.

"Aids to Bacteriology", by H. W. Scott-Wilson, B.Sc., B.M., B.Ch. (Oxon); Seventh Edition; 1946. London: Baillière, Tindall and Cox. 6¼" x 4", pp. 312. Price: 6s.

"The Pathology of Traumatic Injury: A General Review", by James V. Wilson, M.D., M.R.C.P. (London), with a foreword by Philip H. Mitchiner, C.B., C.B.E., T.D., M.D., M.S., F.R.C.S., D.Ch., K.H.S.; 1946. Edinburgh: E. and S. Livingstone, Limited. 6¾" x 7", pp. 204, with many illustrations. Price: 20s.

Diary for the Month.

APRIL 1.—New South Wales Branch, B.M.A.: Council Meeting. Election of Officers.

APRIL 2.—Victorian Branch, B.M.A.: Branch Meeting.

APRIL 2.—Western Australian Branch, B.M.A.: Council Meeting.

APRIL 8.—Tasmanian Branch, B.M.A.: Ordinary Meeting.

APRIL 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee. Organization and Science Committee.

APRIL 10.—South Australian Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute; Brisbane City Council (Medical Officer of Health). Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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